

Thesis/
Reports
Brandle, J. R.

98-6-150
Loan Copy

**GUIDELINES FOR RIPARIAN
BUFFER STRIP PLANT
SELECTION IN THE GREAT PLAINS**

JANUARY 8, 1997

28-04-838 Final Report
University of Nebraska, Dr. James Brandle - P-1

GUIDELINES FOR RIPARIAN
BUFFER STRIP PLANT
SELECTION IN THE GREAT PLAINS

JANUARY 8, 1997

LIBRARY COPY
ROCKY MOUNTAIN RESEARCH STATION
FORT COLLINS CENTER

Woody Plant Selection Guide

Organization

Title Page

Plant List

Map Hardiness / ppt Zones

Site definitions

- ◆ Site Requirements
- ◆ Wildlife: Spp List
 - Habitat ratings
- ◆ Products
- ◆ Descriptions: Spp Computer file list
 - Descriptions

References

COMMON NAMES

Plants are listed alphabetically by their common names. The list of Medium - Large trees is kept separate from that of Small Trees and Shrubs.

MEDIUM / LARGE TREES

COMMON NAME	GENUS	SPECIES	FAMILY
AMERICAN ELM	Ulmus	Americana	Ulmaceae
AMERICAN HORNBEAM	Carpinus	Caroliniana	Betulaceae
AMERICAN LINDEN	Tilia	Americana	Tiliaceae
AMERICAN Sycamore	Platanus	Occidentalis	Platanaceae
ARIZONA WALNUT	Juglans	Major	Juglandaceae
BALD CYPRESS	Taxodium	Distichum	Taxodiaceae
BALSAM POPLAR	Populus	Balsamea	Salicaceae
BITTERNUT HICKORY	Carya	Cordiformis	Juglandaceae
BLACK ASH	Fraxinus	Nigra	Oleaceae
BLACK CHERRY	Prunus	Serotina	Rosaceae
BLACK WALNUT	Juglans	Nigra	Juglandaceae
BLACK WILLOW	Salix	Nigra	Salicaceae
BOXELDER	Acer	Negundo	Aceraceae
BUR OAK	Quercus	Macrocarpa	Fagaceae
CAROLINA LINDEN	Tilia	Caroliniana	Tiliaceae
CHERRYBARK OAK	Quercus	Falcata V. Pagodafolia	Fagaceae
CHINESE ELM	Ulmus	Parvifolia	Ulmaceae
COCKSPUR HAWTHORNE	Crataegus	Crus-Galli	Rosaceae
DESERT WILLOW	Chilopsis	Linearis	Bignoniaceae
DOWNY HAWTHORNE	Crataegus	Mollis	Rosaceae
EASTERN ARBORVITAE	Thuja	Occidentalis	Cupressaceae
EASTERN COTTONWOOD	Populus	Deltoides	Salicaceae
EASTERN HOPHORNBEAM	Ostrya	Virginiana	Betulaceae
EASTERN RED CEDAR	Juniperus	Virginiana	Cupressaceae
FREMONT COTTONWOOD	Populus	Fremontii	Salicaceae
GREEN ASH	Fraxinus	Pennsylvanica	Oleaceae
HACKBERRY	Celtis	Occidentalis	Ulmaceae
LITTLE WALNUT	Juglans	Microcarpa	Juglandaceae
LIVE OAK	Quercus	Virginiana	Fagaceae
NARROWLEAF COTTONWOOD	Populus	Angustifolia	Salicaceae
NEW MEXICO LOCUST	Robinia	Neomexicana	Fabaceae

MEDIUM / LARGE TREES

COMMON NAME	GENUS	SPECIES	FAMILY
OSAGE ORANGE	<i>Maclura</i>	<i>Pomifera</i>	<i>Moraceae</i>
PAPER BIRCH	<i>Betula</i>	<i>Papyrifera</i>	<i>Betulaceae</i>
PEACHLEAF WILLOW	<i>Salix</i>	<i>Amygdaloides</i>	<i>Salicaceae</i>
PECAN	<i>Carya</i>	<i>Illinoensis</i>	<i>Juglandaceae</i>
PERSIMMON	<i>Diospyrus</i>	<i>Virginiana</i>	<i>Ebenaceae</i>
PIN OAK	<i>Quercus</i>	<i>Palustris</i>	<i>Fagaceae</i>
PLAINS COTTONWOOD	<i>Populus</i>	<i>Occidentalis</i>	<i>Salicaceae</i>
QUAKING ASPEN	<i>Populus</i>	<i>Tremuloides</i>	<i>Salicaceae</i>
RED MAPLE	<i>Acer</i>	<i>Rubrum</i>	<i>Aceraceae</i>
RED MULBERRY	<i>Morus</i>	<i>Rubra</i>	<i>Moraceae</i>
RIVER BIRCH	<i>Betula</i>	<i>Nigra</i>	<i>Betulaceae</i>
ROCKY MOUNTAIN JUNIPER	<i>Juniperus</i>	<i>Scopulorum</i>	<i>Cupressaceae</i>
SCREWBEAN MESQUITE	<i>Prosopis</i>	<i>Pubescens</i>	<i>Fabaceae</i>
SHINGLE OAK	<i>Quercus</i>	<i>Imbricaria</i>	<i>Fagaceae</i>
SIBERIAN ELM	<i>Ulmus</i>	<i>Pumila</i>	<i>Ulmaceae</i>
SILVER MAPLE	<i>Acer</i>	<i>Saccharinum</i>	<i>Aceraceae</i>
SOUTHERN RED OAK	<i>Quercus</i>	<i>Falcata</i>	<i>Fagaceae</i>
SUGAR MAPLE	<i>Acer</i>	<i>Saccharum</i>	<i>Aceraceae</i>
SUGARBERRY	<i>Celtis</i>	<i>Laevigata</i>	<i>Ulmaceae</i>
SWEET GUM	<i>Liquidambar</i>	<i>Styraciflua</i>	<i>Hamamelidaceae</i>
TEXAS LIVE OAK	<i>Quercus</i>	<i>Virginiana</i>	<i>Fagaceae</i>
TURKISH FILBERT	<i>Corylus</i>	<i>Fusiformis</i>	<i>Betulaceae</i>
COLUMNA			
VELVET ASH	<i>Fraxinus</i>	<i>Velutina</i>	<i>Oleaceae</i>
WATER BIRCH	<i>Betula</i>	<i>Occidentalis</i>	<i>Betulaceae</i>
WESTERN SOAPBERRY	<i>Sapindus</i>	<i>Drummondii</i>	<i>Sapindaceae</i>
WHITE ASH	<i>Fraxinus</i>	<i>Americana</i>	<i>Oleaceae</i>
WHITE MULBERRY	<i>Morus</i>	<i>Alba</i>	<i>Moraceae</i>
WHITE OAK	<i>Quercus</i>	<i>Alba</i>	<i>Fagaceae</i>
WHITE WILLOW	<i>Salix</i>	<i>Alba</i>	<i>Salicaceae</i>
YELLOW BUCKEYE	<i>Aesculus</i>	<i>Octandra</i>	<i>Hippocastanum</i>

SMALL TREES / SHRUBS

COMMON NAME	GENUS	SPECIES	FAMILY
ALPINE Currant	Ribes	Alpinum	Saxifragaceae
AMERICAN FILBERT	Corylus	Americana	Betulaceae
AMERICAN PLUM	Prunus	Americana	Rosaceae
AUTUMN-OLIVE	Elaeagnus	Umbellata	Elaeagnaceae
BEAKED FILBERT	Corylus	Cornuta	Betulaceae
BEBB WILLOW	Salix	Bebbiana	Salicaceae
BLACK CHOKEBERRY	Aronia	Melanocarpa	Rosaceae
BUCKTHORN	Rhamnus	Cathartica	Rhamnaceae
BUFFALOBERRY	Shepherdia	Argentea	Elaeagnaceae
BUTTONBUSH	Cephalanthus	Occidentalis	Rubiaceae
CHICKASAW PLUM	Prunus	Angustifolia	Rosaceae
CHITTAMWOOD	Bumelia	Languinosa	Sapotaceae
CHOKECHEERRY	Prunus	Virginiana	Rosaceae
CLOVE Currant	Ribes	Odoratum	Saxifragaceae
COMMON NINEBARK	Physocarpus	Opulifolia	Rosaceae
CORNELIAN CHERRY DOGWOOD	Cornus	Mas	Cornaceae
CRANBERRY BUSH VIBURNUM	Viburnum	Trilobum	Caprifoliaceae
DOWNY SERVICEBERRY	Amelanchier	Arborea	Rosaceae
ELDERBERRY	Sambucus	Canadensis	Caprifoliaceae
EUROPEAN ALDER	Alnus	Glutinosa	Betulaceae
FIVE-STAMEN TAMARISK	Tamarix	Ramosissima	Tamaricaceae
FLOWERING DOGWOOD	Cornus	Florida	Cornaceae
FLOWERING QUINCE	Chaenomeles	Japonica	Rosaceae
FRAGRANT SUMAC	Rhus	Aromatica	Anacardiaceae
FRENCH TAMARISK	Tamarix	Gallica	Tamaricaceae
GRAY DOGWOOD	Cornus	Racemosa	Cornaceae
HAZEL ALDER	Alnus	Serrulata	Betulaceae
MEDLAR	Mespilus	Germanica	Rosaceae
NANKING CHERRY	Prunus	Tomentosa	Rosaceae
NANNYBERRY	Viburnum	Lentago	Caprifoliaceae

SMALL TREES / SHRUBS

COMMON NAME	GENUS	SPECIES	FAMILY
PAGODA DOGWOOD	Cornus	Alternifolia	Cornaceae
PAWPAW	Asimina	Triloba	Annonaceae
POSSUMHAW	Ilex	Decidua	Aquifoliaceae
PUSSY WILLOW	Salix	Discolor	Salicaceae
RED CHOKEBERRY	Aronia	Arbutifolia	Rosaceae
REDTWIG DOGWOOD	Cornus	Sericia	Cornaceae
ROUGH-LEAVED DOGWOOD	Cornus	Drummondii	Cornaceae
ROUNDLEAF SERVICEBERRY	Amelanchier	Sanguinea	Rosaceae
RUSSIAN-OLIVE	Elaeagnus	Angustifolia	Elaeagnaceae
SANDBAR WILLOW	Salix	Exigua	Salicaceae
SASKATOON SERVICEBERRY	Amelanchier	Alnifolia	Rosaceae
SHINING SUMAC	Rhus	Coppalina	Anacardiaceae
SIBERIAN PEASHRUB	Caragana	Arborescens	Fabaceae
SILVERBERRY	Elaeagnus	Commutata	Elaeagnaceae
SLENDER WILLOW	Salix	Petiolaris	Salicaceae
SMOOTH SUMAC	Rhus	Glabra	Anacardiaceae
SNOWBERRY	Symphoricarpos	Albus	Caprifoliaceae
SPECKLED ALDER	Alnus	Rugosa	Betulaceae
UTAH SERVICEBERRY	Amelanchier	Utahensis	Rosaceae
WESTERN SANDCHERRY	Prunus	Besseyi	Rosaceae
WOLFBERRY	Symphoricarpos	Occidentalis	Caprifoliaceae

GENUS LIST

Plants are listed alphabetically by genus. The two main groups, Medium-Large Trees and Small Trees & Shrubs are separated.

MEDIUM /
LARGE TREES

GENUS	SPECIES	FAMILY	COMMON NAME
Acer	Negundo	Aceraceae	BOXELDER
Acer	Rubrum	Aceraceae	RED MAPLE
Acer	Saccharinum	Aceraceae	SILVER MAPLE
Acer	Saccharum	Aceraceae	SUGAR MAPLE
Aesculus	Octandra	Hippocastanum	YELLOW BUCKEYE
Betula	Nigra	Betulaceae	RIVER BIRCH
Betula	Occidentalis	Betulaceae	WATER BIRCH
Betula	Papyrifera	Betulaceae	PAPER BIRCH
Carpinus	Caroliniana	Betulaceae	AMERICAN HORNBEAM
Carya	Cordiformis	Juglandaceae	BITTERNUT HICKORY
Carya	Illinoensis	Juglandaceae	PECAN
Celtis	Laevigata	Ulmaceae	SUGARBERRY
Celtis	Occidentalis	Ulmaceae	HACKBERRY
Chilopsis	Linearis	Bignoniaceae	DESERT WILLOW
Corylus	Columna	Betulaceae	TURKISH FILBERT
Crataegus	Crus-Galli	Rosaceae	COCKSPUR HAWTHORNE
Crataegus	Mollis	Rosaceae	DOWNTY HAWTHORNE
Diospyrus	Virginiana	Ebenaceae	PERSIMMON
Fraxinus	Americana	Oleaceae	WHITE ASH
Fraxinus	Nigra	Oleaceae	BLACK ASH
Fraxinus	Pennsylvanica	Oleaceae	GREEN ASH
Fraxinus	Velutina	Oleaceae	VELVET ASH
Juglans	Major	Juglandaceae	ARIZONA WALNUT
Juglans	Microcarpa	Juglandaceae	LITTLE WALNUT
Juglans	Nigra	Juglandaceae	BLACK WALNUT
Juniperus	Scopulorum	Cupressaceae	ROCKY MOUNTAIN JUNIPER
Juniperus	Virginiana	Cupressaceae	EASTERN RED CEDAR

MEDIUM /
LARGE TREES

GENUS	SPECIES	FAMILY	COMMON NAME
Liquidambar	Styraciflua	Hamamelidaceae	SWEET GUM
Maclura	Pomifera	Moraceae	OSAGE ORANGE
Morus	Alba	Moraceae	WHITE MULBERRY
Morus	Rubra	Moraceae	RED MULBERRY
Ostrya	Virginiana	Betulaceae	EASTERN HOPHORNBEAM
Platanus	Occidentalis	Platanaceae	AMERICAN SYCAMORE
Populus	Angustifolia	Salicaceae	NARROWLEAF COTTONWOOD
Populus	Balsamea	Salicaceae	BALSAM POPLAR
Populus	Deltoides	Salicaceae	EASTERN COTTONWOOD
Populus	Fremontii	Salicaceae	FREMONT COTTONWOOD
Populus	Occidentalis	Salicaceae	PLAINS COTTONWOOD
Populus	Tremuloides	Salicaceae	QUAKING ASPEN
Prosopsis	Pubescens	Fabaceae	SCREWBEAN MESQUITE
Prunus	Serotina	Rosaceae	BLACK CHERRY
Quercus	Alba	Fagaceae	WHITE OAK
Quercus	Falcata	Fagaceae	SOUTHERN RED OAK
Quercus	Falcata V. Pagodafolia	Fagaceae	CHERRYBARK OAK
Quercus	Imbricaria	Fagaceae	SHINGLE OAK
Quercus	Macrocarpa	Fagaceae	BUR OAK
Quercus	Palustris	Fagaceae	PIN OAK
Quercus	Rubra	Fagaceae	NORTHERN RED OAK
Quercus	Virginiana	Fagaceae	LIVE OAK
Quercus	Virginiana V. Fusiformis	Fagaceae	TEXAS LIVE OAK
Robinia	Neomexicana	Fabaceae	NEW MEXICO LOCUST
Salix	Alba	Salicaceae	WHITE WILLOW
Salix	Amygdaloides	Salicaceae	PEACHLEAF WILLOW
Salix	Nigra	Salicaceae	BLACK WILLOW
Sapindus	Drummondii	Sapindaceae	WESTERN SOAPBERRY

MEDIUM /
LARGE TREES

GENUS	SPECIES	FAMILY	COMMON NAME
<i>Taxodium</i>	<i>Distichum</i>	<i>Taxodiaceae</i>	BALD CYPRESS
<i>Thuja</i>	<i>Occidentalis</i>	<i>Cupressaceae</i>	EASTERN ARBORVITAE
<i>Tilia</i>	<i>Americana</i>	<i>Tiliaceae</i>	AMERICAN LINDEN
<i>Tilia</i>	<i>Caroliniana</i>	<i>Tiliaceae</i>	CAROLINA LINDEN
<i>Ulmus</i>	<i>Americana</i>	<i>Ulmaceae</i>	AMERICAN ELM
<i>Ulmus</i>	<i>Parvifolia</i>	<i>Ulmaceae</i>	CHINESE ELM
<i>Ulmus</i>	<i>Pumila</i>	<i>Ulmaceae</i>	SIBERIAN ELM

SMALL TREES
& SHRUBS

GENUS	SPECIES	FAMILY	COMMON NAME
Alnus	Glutinosa	Betulaceae	EUROPEAN ALDER
Alnus	Rugosa	Betulaceae	SPECKLED ALDER
Alnus	Serrulata	Betulaceae	HAZEL ALDER
Amelanchier	Alnifolia	Rosaceae	SASKATOON SERVICEBERRY
Amelanchier	Arborea	Rosaceae	DOWNTY SERVICEBERRY
Amelanchier	Sanguinea	Rosaceae	ROUNDLEAF SERVICEBERRY
Amelanchier	Utahensis	Rosaceae	UTAH SERVICEBERRY
Aronia	Arbutifolia	Rosaceae	RED CHOKEBERRY
Aronia	Melanocarpa	Rosaceae	BLACK CHOKEBERRY
Asimina	Triloba	Annonaceae	PAWPAW
Bumelia	Languinosa	Sapotaceae	CHITTAMWOOD
Caragana	Arborescens	Fabaceae	SIBERIAN PEASHRUB
Cephalanthus	Occidentalis	Rubiaceae	BUTTONBUSH
Chaenomeles	Japonica	Rosaceae	FLOWERING QUINCE
Cornus	Alternifolia	Cornaceae	PAGODA DOGWOOD
Cornus	Drummondii	Cornaceae	ROUGH-LEAVED DOGWOOD
Cornus	Florida	Cornaceae	FLOWERING DOGWOOD
Cornus	Mas	Cornaceae	CORNELIAN CHERRY DOGWOOD
Cornus	Racemosa	Cornaceae	GRAY DOGWOOD
Cornus	Sericcea	Cornaceae	REDTWIG DOGWOOD
Corylus	Americana	Betulaceae	AMERICAN FILBERT
Corylus	Cornuta	Betulaceae	BEAKED FILBERT
Elaeagnus	Angustifolia	Elaeagnaceae	RUSSIAN-OLIVE
Elaeagnus	Commutata	Elaeagnaceae	SILVERBERRY
Elaeagnus	Umbellata	Elaeagnaceae	AUTUMN-OLIVE
Ilex	Decidua	Aquifoliaceae	POSSUMHAW
Mespilus	Germanica	Rosaceae	MEDLAR

SMALL TREES
& SHRUBS

GENUS	SPECIES	FAMILY	COMMON NAME
Physocarpus	Opulifolia	Rosaceae	COMMON NINEBARK
Prunus	Americana	Rosaceae	AMERICAN PLUM
Prunus	Angustifolia	Rosaceae	CHICKASAW PLUM
Prunus	Besseyi	Rosaceae	WESTERN SANDCHERRY
Prunus	Tomentosa	Rosaceae	NANKING CHERRY
Prunus	Virginiana	Rosaceae	CHOKECHERRY
Rhamnus	Cathartica	Rhamnaceae	BUCKTHORN
Rhus	Aromatica	Anacardiaceae	FRAGRANT SUMAC
Rhus	Coppalina	Anacardiaceae	SHINING SUMAC
Rhus	Glabra	Anacardiaceae	SMOOTH SUMAC
Ribes	Alpinum	Saxifragaceae	ALPINE Currant
Ribes	Odoratum	Saxifragaceae	CLOVE Currant
Salix	Bebbiana	Salicaceae	BEBB WILLOW
Salix	Discolor	Salicaceae	PUSSY WILLOW
Salix	Exigua	Salicaceae	SANDBAR WILLOW
Salix	Petiolaris	Salicaceae	SLENDER WILLOW
Sambucus	Canadensis	Caprifoliaceae	ELDERBERRY
Shepherdia	Argentea	Elaeagnaceae	BUFFALOBERRY
Symphoricarpos	Albus	Caprifoliaceae	SNOWBERRY
Symphoricarpos	Occidentalis	Caprifoliaceae	WOLFBERRY
Tamarix	Gallica	Tamaricaceae	FRENCH TAMARISK
Tamarix	Ramosissima	Tamaricaceae	FIVE-STAMEN TAMARISK
Viburnum	Lentago	Caprifoliaceae	NANNYBERRY
Viburnum	Trilobum	Caprifoliaceae	CRANBERRY BUSH VIBURNUM

DISKETTE INDEX

This list shows the order in which the plants are listed on the diskette index.

The title of each file begins with a numerical listing, followed by a combination of the first three letters of the plant's genus and species.

LIST OF TREES AND SHRUBS

MEDIUM / LARGE TREES

Foldername : RIP. PLA 635 KB
filename : LIST

ACER

- 01 **01ace.neg** (Acer negundo) Boxelder
- 02 **02ace.rub** (A. rubrum) Red Maple
- 03 **03ace.sil** (A. saccharinum) Silver Maple
- 04 **04ace.sug** (A. saccharum) Sugar Maple

AESCRULUS

- 05 **05aes.oct** (Aesculus octandra) Yellow Buckeye

BETULA

- 06 **06beg.nig** (Betula nigra) River Birch
- 07 **07bet.occ** (B. occidentalis) Water Birch
- 08 **08bet.pap** (B. papyrifera) Paper Birch

CARPINUS

- 09 **09car.car** (Carpinus caroliniana) American Hornbeam

CARYA

- 10 **10car.cor** (Carya cordiformis) Bitternut Hickory
- 11 **11car.ill** (C. illinoensis) Pecan

JUNIPERUS

26 **26jun.sco** (*Juniperus scopulorum*) Rocky Mountain Juniper
27 **27jun.vir** (*J. virginiana*) Eastern Redcedar

LIQUIDAMBAR

28 **28liq.sty** (*Liquidambar styraciflua*) Sweet Gum

MACLURA

29 **29mac.pom** (*Maclura pomifera*) Osage Orange

MORUS

30 **30mor.alb** (*Morus alba*) White Mulberry
31 **31mor.rub** (*Morus rubra*) Red Mulberry

OSTRYA

32 **32ost.vir** (*Ostrya virginiana*) American Hophornbeam

PLATANUS

33 **33pla.occ** (*Platanus occidentalis*) American Sycamore

POPULUS

34 **34pop.ang** (*Populus angustifolia*) Narrowleaf Cottonwood
35 **35pop.bal** (*P. balsamea*) Balsam Poplar
36 **36pop.del** (*P. deltoides*) Eastern Cottonwood
37 **37pop.fre** (*P. fremontii*) Fremont Cottonwood
38 **38pop.occ** (*P. occidentalis*) Plains Cottonwood

SAPINDUS

52 **52sap.dru** (Sapindus drummondii) Western Soapberry

TAXODIUM

53 **53tax.dis** (Taxodium distichum) Bald Cypress

THUJA

54 **54thu.occ** (Thuja occidentalis) Eastern Arborvitae

TILIA

55-56 **55-56til** (Tilia americana) American Linden/American Basswood
(T. caroliniana) Carolina Basswood/Carolina Linden

ULMUS

57 **57ulm.ame** (Ulmus americana) American Elm

58 **58ulm.par** (U. parvifolia) Chinese Elm

59 **59ulm.pum** (U. pumila) Siberian Elm

CHAENOMELES

67 **67cha.spe** (Chaenomeles japonica) Flowering Quince

CORNUS

68 **68cor.alt** (Cornus alternifolia) Pagoda Dogwood

69 **69cor.dru** (C. drummondii) Rough-leaved Dogwood

70 **70cor.flo** (C. florida) Flowering Dogwood

71 **71cor.mas** (C. mas) Cornelian Cherry Dogwood

72 **72cor.rac** (C. racemosa) Gray Dogwood

73 **73cor.ser** (C. sericea) Redtwig Dogwood

CORYLUS

74-75 **74-75cor** (Corylus americana) American Filbert
 (C. cornuta) Beaked Filbert

CYDONIA

76 **76cyd.obl** (Cydonia oblonga) Quince

ELEAGNUS

77 **77ela.ang** (Eleagnus angustifolia) Russian-Olive

78 **78ela.com** (E. commutata) Silverberry

79 **79ela.umb** (E. umbellata) Autumn-Olive

ILEX

80 **80ile.dec** (Ilex decidua) Possumhaw

SALIX SHRUBS

94 **94sal.shr** (Salix bebbiana) Bebb Willow
 (S. discolor) Pussy Willow
 (S. exigua) Sandbar Willow
 (S. petiolaris) Slender Willow

SAMBUCUS

95 **95sam.can** (Sambucus canadensis) Elderberry

SHEPHERDIA

96 **96she.arg** (Shepherdia argentea) Buffaloberry

SYMPHORICARPOS

97 **97sym.alb** (Symporicarpos albus) Snowberry

98 **98sym.occ** (S. occidentalis) Wolfberry

TAMARIX

99 **99tamari** (Tamarix species) Saltcedar

VIBURNUM

100 **100vib.len** (Viburnum lentago) Nannyberry

101 **101vib.tri** (V. trilobum) Cranberry Bush Virburnum

USDA 5 - E	USDA 9 - E	Soils - Fine clay to coarse sand.
Sites - 1, 2, 3, 4	pH: 5.1 - 6.5	Comments - Less drought tolerance than Black Ch

BLACK	Hardiness	USDA 6 -	Light Requirements - Full Sun to half shade.
CHOKEBERRY	USDA 3 - E	USDA 7 -	Flood Tolerance - Very flood tolerant.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Resists drought.
	USDA 5 - E	USDA 9 -	Soils - Fine clay to coarse sand and gravel.
	Sites - 1, 2, 3, 4	pH: 5.1 - 6.5	Comments -

SML. TREES/SHRUBS

COMMON NAME

PAWPAW	Hardiness	USDA 6 - E, C	Light Requirements - Very shade tolerant. Best in
	USDA 3 -	USDA 7 - E	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Sensitive to drought.
	USDA 5 - E	USDA 9 -	Soils - Loamy soils.
	Sites - 3	pH: 6.1- 8.0	Comments -

GUM BUMELIA	Hardiness	USDA 6 - E, C,	Light Requirements - No information.
	USDA 3 -	USDA 7 - E, C,	Flood Tolerance - Moderate tolerance probable.
	USDA 4 -	USDA 8 - E, C, W	Drought Tolerance - Very drought tolerant.
	USDA 5 - E	USDA 9 - E, C, W	Soils - Coarse sands to medium textured soils.
	Sites - 1, 2, 3, 4	pH: No Info.	Comments - Choose proper variety for area of Gr

SIBERIAN	Hardiness	USDA 6 -	Light Requirements - Full Sun to light shade.
PEASHRUB	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Probably intolerant to low tolera
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Highly resistant to drought.
	USDA 5 - E	USDA 9 -	Soil - Adaptable to many soils.

HARDINESS - PRECIPITATION MAP

EACH ZONE IS SPLIT INTO EASTERN, CENTRAL AND WESTERN SECTIONS ON THE BASIS OF TOTAL INCHES OF MEAN ANNUAL PRECIPITATION.

USDA ZONE 3 (*Average annual minimum temperature: -30° to -40° F*)

EASTERN: 16" or more. **CENTRAL:** 14 - 16". **WESTERN:** Less than 14".

USDA ZONE 4 (*Average annual minimum temperature: -20° to -30° F*)

EASTERN: 20" or more. **CENTRAL:** 15 - 20". **WESTERN:** Less than 15".

USDA ZONE 5 (*Average annual minimum temperature: -10° to -20° F*)

EASTERN: 25" or more. **CENTRAL:** 18 - 25". **WESTERN:** Less than 18".

USDA ZONE 6 (*Average annual minimum temperature: 0° to -10° F*)

EASTERN: 30" or more. **CENTRAL:** 15 - 30". **WESTERN:** Less than 15".

USDA ZONE 7 (*Average annual minimum temperature: 10° to 0° F*)

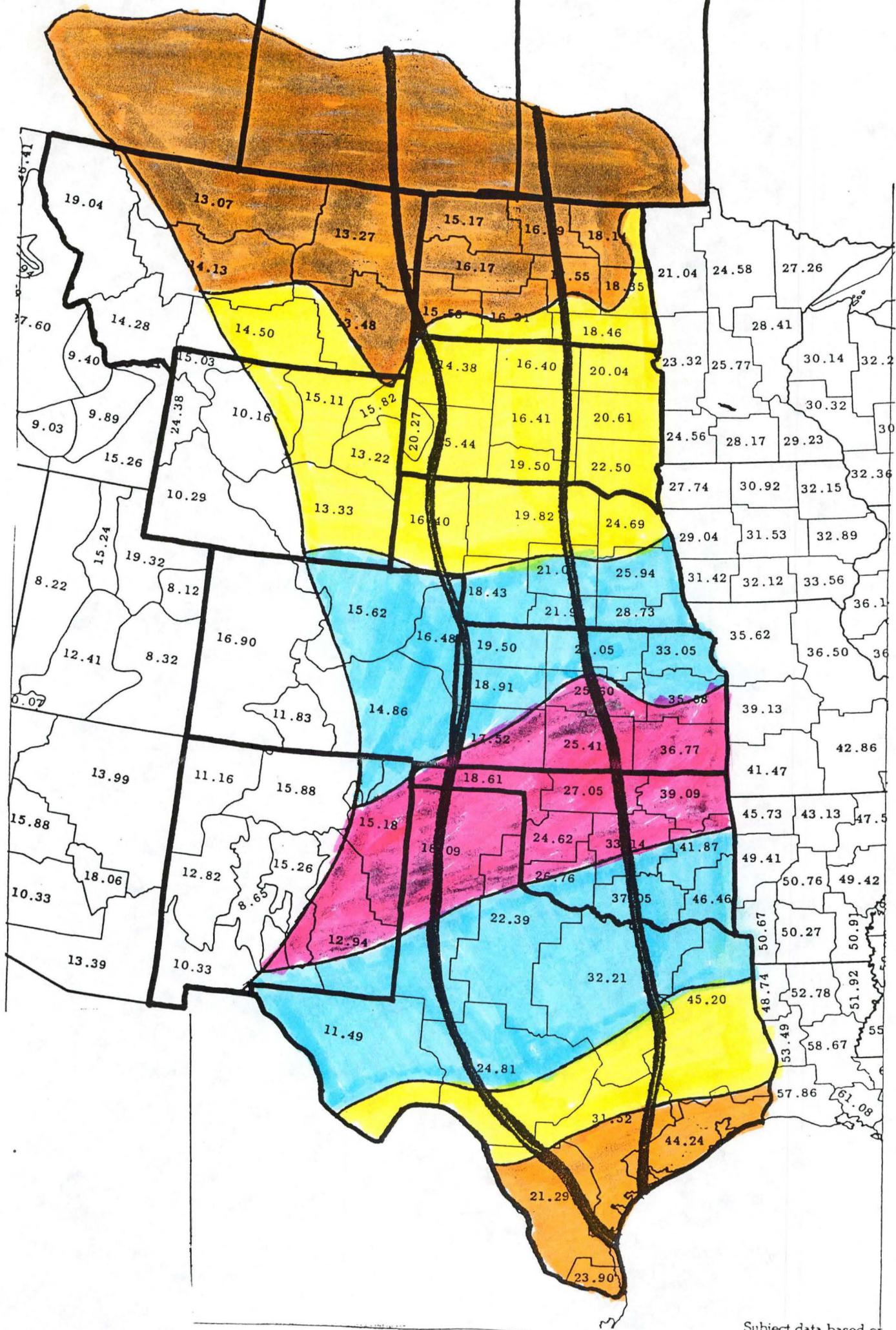
EASTERN: 35" or more. **CENTRAL:** 20 - 35". **WESTERN:** Less than 20".

USDA ZONE 8 (*Average annual minimum temperature: 20° to 10° F*)

EASTERN: 35" or more. **CENTRAL:** 20 - 35". **WESTERN:** Less than 20".

USDA ZONE 9 (*Average annual minimum temperature: 30° to 20° F*)

EASTERN: 35" or more. **CENTRAL:** 25 - 35". **WESTERN:** Less than 25".



SITE DEFINITIONS

SITE 1

Site 1 is the stream and area immediately adjacent to it. All species may be planted along the stream and, in some cases, within the stream bed.

SITE 2

Site 2 is the floodplain. Plants listed for Site 2 must have at least moderate flood tolerance (up to 30% of the growing season). Site 2 is equivalent to Zone 1 (Undisturbed Forest) on the attached drawing.

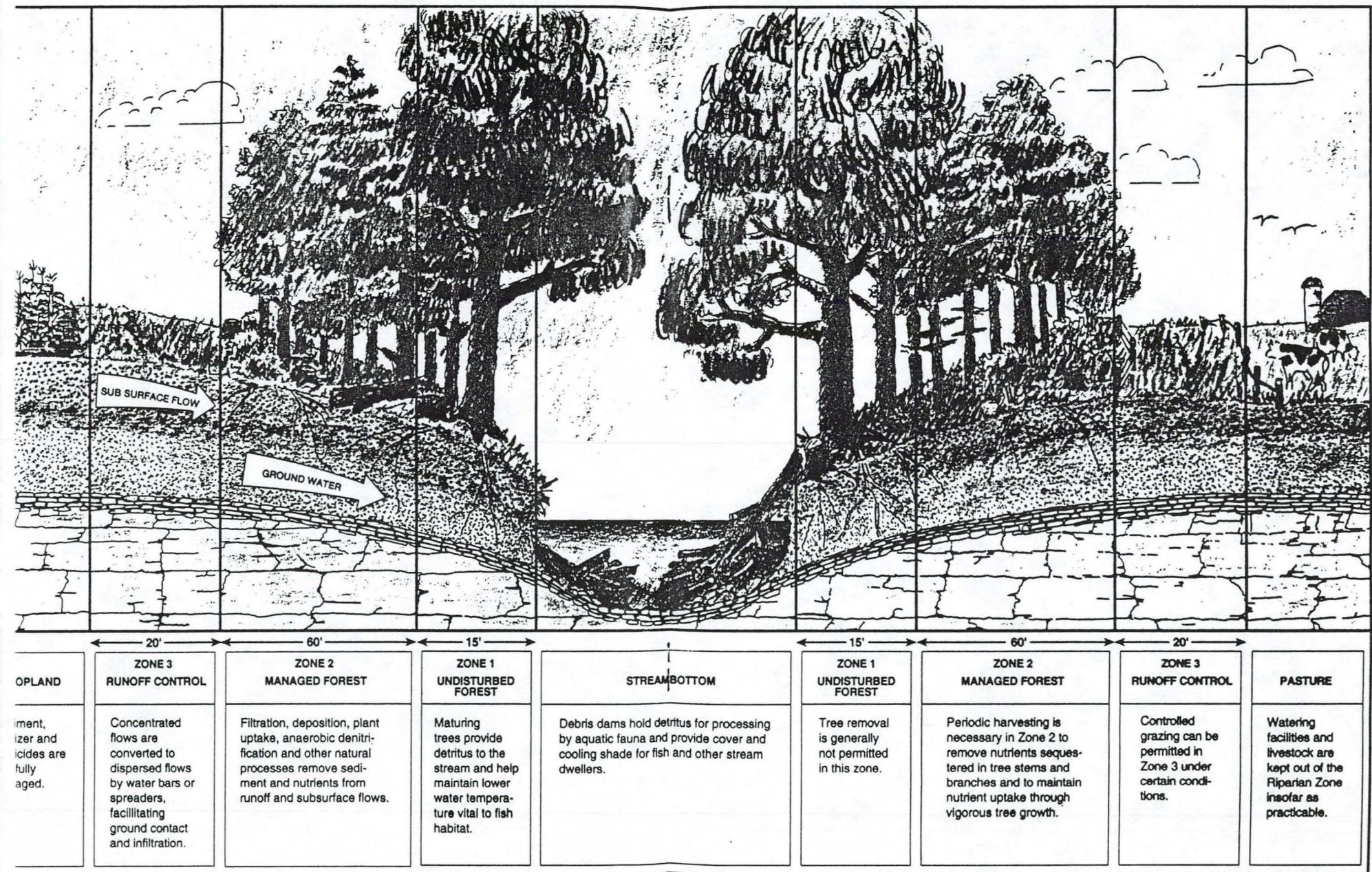
SITE 3

Site 3 is the lower slope adjacent to the flood plain. Site 3 soils are moist, but not wet. On the drawing, Site 3 equates to Zone 2 (Managed Forest).

SITE 4

Site 4 is the upper slope area. Site 4 species require a high degree of drought tolerance. Site 4 is similar to Zone 3 (Runoff Control) in the drawing.

THE STREAMSIDE FOREST BUFFER



MED. / LARGE TREES

COMMON NAME

BOXELDER	Hardiness	USDA 6 - E, C,	Light Requirements - Full Sun. Tolerates shade.
	USDA 3 - E, C, W	USDA 7 - E, C	Flood Tolerance - Up to one full season of flooding.
	USDA 4 - E, C, W	USDA 8 - E, C	Drought Tolerance - Extremely drought tolerant.
	USDA 5 - E, C, W	USDA 9 - E, C	Soils - Coarse to fine soils.
	Sites - 1, 2, 3, 4	pH: 6.5 - 7.5	Comments - Tolerates acid soils (pH levels as low as 4.5).
RED MAPLE	Hardiness	USDA 6 - E	Light Requirements - Shade tolerant.
	USDA 3 - E	USDA 7 - E	Flood Tolerance - One third to a full season.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Not as tolerant as Boxelder.
	USDA 5 - E	USDA 9 - E	Soils - Coarse sand to very fine clay.
	Sites - 1, 2, 3, 4	pH: 4.5 - 6.5	Comments - Very resistant to herbicide damage. Tolerates moist to wet soils.
SILVER MAPLE	Hardiness	USDA 6 - E, C	Light Requirements - Shade tolerance varies. Co
	USDA 3 - E, C	USDA 7 - E, C	Flood Tolerance - Up to one full season of flooding.
	USDA 4 - E, C, W	USDA 8 - E	Drought Tolerance - Highly resistant.
	USDA 5 - E, C, W	USDA 9 -	Soils - Silty clay to loamy soils.
	Sites - 1, 2, 3, 4	pH: 5.5 - 6.5	Comments - Shade tolerance depends on site quality. Maple is shade tolerant on good sites.

MED. / LARGE TREES

COMMON NAME

SUGAR MAPLE	Hardiness	USDA 6 - E	Light Requirements - Very tolerant of shade.
	USDA 3 - E	USDA 7 -	Flood Tolerance - Highly Intolerant.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Requires moist soils.
	USDA 5 - E	USDA 9 -	Soils - Well drained loams to sandy soils.
	Sites - 3	pH: 5.5 - 7.3	Comments - Plant outside of floodplain. Does not tolerate long period of flooding.

YELLOW BUCKEYE	Hardiness	USDA 6 - E	Light Requirements - Shade tolerant.
	USDA 3 -	USDA 7 - E	Flood Tolerance - 20 - 30% of the growing season.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Moderate drought tolerance.
	USDA 5 - E	USDA 9 -	Soils - Grows best in medium textured loams.
			Comments -
	Sites - 2, 3	pH: 6.1 - 7.0	

RIVER BIRCH	Hardiness	USDA 6 - E, C	Light Requirements - Intolerant of shade.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Up to 25% of the growing season.
	USDA 4 - E, C	USDA 8 - E	Drought Tolerance - Drought resistant.
	USDA 5 - E, C	USDA 9 - E	Soils - Coarse sands to heavy clay.
	Sites - 2, 3, 4	pH: Below 6.5	Comments - Mature trees are flood tolerant, but are often killed. Species grows well on hot, dry sites.

MED. / LARGE TREES

COMMON NAME

WATER BIRCH	Hardiness	USDA 6 - W	Light Requirements - No information.
	USDA 3 - E, C, W	USDA 7 - W	Flood Tolerance - 30-40% of the growing season.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Intermediate tolerance.
	USDA 5 - C, W	USDA 9 -	Soils - No information.
	Sites - 1, 2, 3, 4	pH: No Info.	Comments - Competes successfully with other species.

PAPER BIRCH	Hardiness	USDA 6 -	Light Requirements - Shade intolerant.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Highly intolerant.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Moderate drought resistance.
	USDA 5 - E, W	USDA 9 -	Soils - Coarse to moderately fine loams.
	Sites - 3, 4	pH: 5.0 - 8.0	Comments - Nutrient sensitive. Does not survive period of flooding.

AMERICAN	Hardiness	USDA 6 - E	Light Requirements - Extremely shade tolerant.
----------	-----------	------------	--

HORNBEAM	USDA 3 - USDA 4 - E USDA 5 - E Sites - 1, 2, 3	USDA 7 - E USDA 8 - E USDA 9 - E pH: 4.0 - 5.6	Flood Tolerance - Up to 25% of the growing season Drought Tolerance - Comments. Soils - Medium to finely textured loams. Comments - Sensitive to combined effects of heat Tolerates pH levels up to 7.1.
----------	---	---	--

MED. / LARGE TREES

COMMON NAME

BITTERNUT	Hardiness USDA 3 - USDA 4 - E USDA 5 - E Sites - 2, 3, 4	USDA 6 - E USDA 7 - E USDA 8 - E USDA 9 - pH: 5.6 - 8.0	Light Requirements - Generally intolerant of shade Flood Tolerance - Low. Less than 30 days per year Drought Tolerance - Moderate drought tolerance. Soils - Coarse loam to sandy clay soils. Comments -
-----------	--	---	--

PECAN	Hardiness USDA 3 - USDA 4 - USDA 5 - E Sites - 1, 2, 3, 4	USDA 6 - E, C USDA 7 - E, C USDA 8 - E, C, W USDA 9 - E, C, W pH: 6.5 - 7.5	Light Requirements - Intolerant of shade. Flood Tolerance - Moderate. 30 days to a full sea Drought Tolerance - Moderate drought tolerance. Soils - Fairly coarse to moderately fine soils. Comments -
-------	---	---	--

HACKBERRY	Hardiness USDA 3 - E, C, W USDA 4 - E, C, W USDA 5 - E, C, W Sites - 1, 2, 3, 4	USDA 6 - E, C USDA 7 - E, C USDA 8 - USDA 9 - pH: 6.6 - 8.0	Light Requirements - Intermediate shade tolerance. Flood Tolerance - Comments. Drought Tolerance - Drought resistant. Soils - Coarse to moderately fine soils. Comments - Mature trees tolerate up to a full sea flooding. Seedlings are intolerant.
-----------	---	---	---

MED. / LARGE TREES

COMMON NAME

SUGARBERRY	Hardiness	USDA 6 - E, C,	Light Requirements - Shade tolerant.
------------	-----------	----------------	--------------------------------------

USDA 3 -	USDA 7 - E, C,	Flood Tolerance - Tolerates up to one full season.
USDA 4 -	USDA 8 - E, C, W	Drought Tolerance - Resists drought.
USDA 5 -	USDA 9 - E, C, W	Soils - Grows in Entisol and Inceptisol soils.
Comments -		
Sites - 1, 2, 3, 4	pH: No Info.	

DESERT WILLOW	Hardiness	USDA 6 - W	Light Requirements - No information.
	USDA 3 -	USDA 7 - W	Flood Tolerance - Moderate. 20 - 30% of growing
	USDA 4 -	USDA 8 - W	Drought Tolerance - Extremely drought tolerant.
	USDA 5 -	USDA 9 - W	Soils - Gravel to rocky soils.
Comments -			
Sites - 1, 2, 3, 4	pH: No Info.		

TURKISH FILBERT	Hardiness	USDA 6 -	Light Requirements - Full Sun.
	USDA 3 -	USDA 7 -	Flood Tolerance - No information.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Tolerates heat and drought.
	USDA 5 - E	USDA 9 -	Soils - Adaptable to a wide range of soils.
Comments - Seedlings planted on upland sites may require additional watering.			
Sites - 2, 3, 4	pH: Adaptable		

MED. / LARGE TREES

COMMON NAME

COCKSPUR	Hardiness	USDA 6 - E, C	Light Requirements - Intolerant of shade.
HAWTHORN	USDA 3 -	USDA 7 - E, C	Flood Tolerance - Moderate. Up to 1/3 of growing
	USDA 4 - E, C	USDA 8 - E, C	Drought Tolerance - Resists drought.
	USDA 5 - E, C	USDA 9 -	Soils - Moderately coarse to fine textured soils.
Comments -			
Sites - 2, 3, 4	pH: 6.1 - 8.0		

DOWNTY	Hardiness	USDA 6 - E, C	Light Requirements - Shade intolerant.
HAWTHORNE	USDA 3 - E	USDA 7 - E	Flood Tolerance - Moderate. Up to 1/3 of growing

USDA 4 - E	USDA 8 - E	Drought Tolerance - Very tolerant of drought.
USDA 5 - E, C	USDA 9 -	Soils - Moderately coarse loams to fine clays.
Sites - 2, 3, 4	pH: 6.1 - 8.0	Comments -

PERSIMMON	Hardiness	USDA 6 - E, W	Light Requirements - Very shade tolerant.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Up to one full season of flooding
	USDA 4 -	USDA 8 - E	Drought Tolerance - Tolerates drought conditions.
	USDA 5 - E, W	USDA 9 - E	Soils - Medium textured to moderately fine soils.
	Sites - 1, 2, 3, 4	pH: 6.1 - 6.5	Comments -

MED. / LARGE TREES

COMMON NAME

WHITE ASH	Hardiness	USDA 6 - E, C	Light Requirements - Plant in full Sun.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Up to one full season of flooding
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Moderate drought tolerance.
	USDA 5 - E, C	USDA 9 -	Soils - Moderately fine to fairly coarse soils.
	Sites - 1, 2, 3	pH: 5.0 - 7.5	Comments - Seedlings tolerate shade. Mature trees intolerant.

BLACK ASH	Hardiness	USDA 6 -	Light Requirements - Intolerant of shade.
	USDA 3 - E	USDA 7 -	Flood Tolerance - Very tolerant. Over 40% of seeds
	USDA 4 - E	USDA 8 -	Drought Tolerance - Tolerates drought.
	USDA 5 - E	USDA 9 -	Soils - Moderately coarse to fine soils.
	Sites - 1, 2, 3, 4	pH: 4.4 - 8.2	Comments - Grows best in running water and soils with high water tables.

GREEN ASH	Hardiness	USDA 6 - E, C	Light Requirements - Varies by location. Commonly
	USDA 3 - E, C, W	USDA 7 - E, C	Flood Tolerance - Very tolerant. More than one foot
	USDA 4 - E, C, W	USDA 8 - E, C	Drought Tolerance - Resists drought.

USDA 5 - E, C	USDA 9 - E, C	Soils - Coarse to medium textured soils.
Sites - 1, 2, 3, 4	pH: 7.5 - 8.0	Comments - Southern seedlings are more tolerant All trees lose their tolerance with age.

MED. / LARGE TREES

COMMON NAME

VELVET ASH	Hardiness	USDA 6 - W	Light Requirements - Species has little shade toler
	USDA 3 -	USDA 7 - W	Flood Tolerance - Probably intermediate. Comme
	USDA 4 -	USDA 8 - W	Drought Tolerance - Highly resistant.
	USDA 5 -	USDA 9 -	Soils - No specific information.
	Sites - 1, 2, 3, 4	pH: Comments	Comments - Neutral to alkaline soils. Flood tolera 30 - 40% of the growing season is likely.

ARIZONA WALNUT	Hardiness	USDA 6 - W	Light Requirements - Plant in full Sun.
	USDA 3 -	USDA 7 - C,	Flood Tolerance - Probably intermediate. Comme
	USDA 4 -	USDA 8 - C, W	Drought Tolerance - Very drought tolerant.
	USDA 5 -	USDA 9 -	Soils - No information.
	Sites - 1, 2, 3, 4	pH: No Info.	Comments - Flood tolerance lasting 30 - 40% of th season is likely.

LITTLE WALNUT	Hardiness	USDA 6 - C,	Light Requirements - Very intolerant of shade.
	USDA 3 -	USDA 7 - C,	Flood Tolerance - Probably moderate. Comments
	USDA 4 -	USDA 8 - C, W	Drought Tolerance - Very drought resistant.
	USDA 5 -	USDA 9 - W	Soils - No information.
	Sites - 1, 2, 3, 4	pH: No Info.	Comments - Flood tolerance lasting 30 - 40% of th season is likely.

MED. / LARGE TREES

COMMON NAME

BLACK WALNUT	Hardiness	USDA 6 - E, C	Light Requirements - Intolerant of shade.
	USDA 3 -	USDA 7 - E, C	Flood Tolerance - 90 - 150 days.
	USDA 4 - E, C	USDA 8 - E, C	Drought Tolerance - Tolerates drought.

	USDA 5 - E, C	USDA 9 - E, C	Soils - Moderately coarse to moderately fine soils.
	Sites - 1, 2, 3, 4	pH: 6.6 - 8.0	Comments - Grows best in deep soils.
ROCKY MOUNTAIN	Hardiness	USDA 6 - W	Light Requirements - Comments.
JUNIPER	USDA 3 - C, W	USDA 7 - W	Flood Tolerance - No information.
	USDA 4 - C, W	USDA 8 -	Drought Tolerance - Very tolerant once established.
	USDA 5 - C, W	USDA 9 -	Soils - Adaptable to a wide range of Mollisol soils.
	Sites - 2, 3, 4	pH: No Info.	Comments - Tolerates shade through sapling stage. Trees require full Sun.
EASTERN	Hardiness	USDA 6 - E, C	Light Requirements - Comments.
RED CEDAR	USDA 3 - E, C	USDA 7 - E, C	Flood Tolerance - Low. 10 - 30 consecutive days of flooding.
	USDA 4 - E, C, W	USDA 8 - E, C	Drought Tolerance - Highly tolerant of drought.
	USDA 5 - E, C, W	USDA 9 - E, C	Soils - Grows in all soil textures.
	Sites - 3, 4	pH: 4.7 - 7.8	Comments - Young specimens have intermediate tolerance. Older trees require full Sun.

MED. / LARGE TREES

COMMON NAME

SWEETGUM	Hardiness	USDA 6 - E	Light Requirements - Shade intolerant.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Up to a full season of flooding.
	USDA 4 -	USDA 8 - E	Drought Tolerance - Moderate drought tolerance.
	USDA 5 - E	USDA 9 - E	Soils - Moderately coarse to fine textured soils.
	Sites - 1, 2, 3	pH: 6.1 - 6.5	Comments -
OSAGE-ORANGE	Hardiness	USDA 6 - E, C	Light Requirements - Comments.
	USDA 3 -	USDA 7 - E, C	Flood Tolerance - At least 30 days per season.
	USDA 4 -	USDA 8 - C	Drought Tolerance - Very tolerant of drought.
	USDA 5 - E, C	USDA 9 - C	Soils - Grows in most types of soil.

			Comments - Probably intolerant of shade. Plant in best results.
WHITE MULBERRY	Hardiness	USDA 6 - E, C	Light Requirements - Full Sun to light shade.
	USDA 3 -	USDA 7 - E, C	Flood Tolerance - Comments.
	USDA 4 - E, C	USDA 8 - E	Drought Tolerance - Tolerates drought.
	USDA 5 - E, C	USDA 9 -	Soils - Adapts to most soils.
			Comments - Survives 10 day period of flooding. of flood tolerance is unknown.
Sites - 2, 3, 4	pH: No Info.		

MED. / LARGE TREES

COMMON NAME

RED MULBERRY	Hardiness	USDA 6 - E, C	Light Requirements - Has some shade tolerance.
	USDA 3 -	USDA 7 - E, C	Flood Tolerance - Moderate. 30 - 40% of growing
	USDA 4 -	USDA 8 - E, C, W	Drought Tolerance - Very drought tolerant.
	USDA 5 - E, C	USDA 9 - E, C	Soils - Moderately coarse soils.
			Comments - Survives in a foot of standing water over course of one full season.
Sites - 1, 2, 3, 4	pH: 6.3 - 8.0		

EASTERN	Hardiness	USDA 6 - E, C	Light Requirements - Understory species. Plant in
HOPHORNBEAM	USDA 3 - E	USDA 7 - E, C	Flood Tolerance - Very intolerant of flooding.
	USDA 4 - E, C, W	USDA 8 - E, C	Drought Tolerance - Intermediate resistance.
	USDA 5 - E, C	USDA 9 - E	Soils - Finely textured to moderately coarse soils.
			Comments - pH Requirements: USDA Zones 2-5: USDA Zones 6-9: 4.6 - 5.6.
Sites - 3, 4	pH: Comments		

AMERICAN	Hardiness	USDA 6 - E, C	Light Requirements - Comments.
SYCAMORE	USDA 3 -	USDA 7 - E, C	Flood Tolerance - Up to a full season of flooding.
	USDA 4 - E, C	USDA 8 - E, C	Drought Tolerance - Resists drought.
	USDA 5 - E, C	USDA 9 -	Soils - Coarse to moderately fine soils.
			Comments - Young trees require direct light. Mat

Sites - 1, 2, 3, 4 pH: 6.6 - 8.0 have moderate shade tolerance.

MED. / LARGE TREES

COMMON NAME

NARROWLEAF	Hardiness	USDA 6 - W	Light Requirements - Intolerant of shade.
COTTONWOOD	USDA 3 - W	USDA 7 - W	Flood Tolerance - Tolerates flooding. Comments.
	USDA 4 - W	USDA 8 -	Drought Tolerance - Moderate tolerance is probabl
	USDA 5 - W	USDA 9 -	Soils - No information.
	Sites - 1, 2, 3	pH: No Info.	Comments - Full extent of flood tolerance is unkn

BALSAM POPLAR	Hardiness	USDA 6 -	Light Requirements - Does not tolerate shade.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Very tolerant. Comments.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Moderate drought tolerance.
	USDA 5 - W	USDA 9 -	Soils - Grows best in flood plain soils.
	Sites - 1, 2, 3	pH: Above 7.2	Comments - Full extent of flood tolerance is unkn

EASTERN	Hardiness	USDA 6 - E, C	Light Requirements - Does not tolerate shade.
COTTONWOOD	USDA 3 - E, C, W	USDA 7 - E, C	Flood Tolerance - Comments.
	USDA 4 - E, C, W	USDA 8 - E, C	Drought Tolerance - Drought tolerant.
	USDA 5 - E, C, W	USDA 9 - E	Soils - Grows in all soil textures, but prefers fine s
	Sites - 1, 2, 3, 4	pH: 6.5 - 7.5	Comments - Results from studies on flood toleran A full season of flood tolerance at most.

MED. / LARGE TREES

COMMON NAME

FREMONT	Hardiness	USDA 6 - C,	Light Requirements - No information.
COTTONWOOD	USDA 3 -	USDA 7 - C,	Flood Tolerance - Tolerates flooding.
	USDA 4 -	USDA 8 -	Drought Tolerance - Intolerant.
	USDA 5 - W	USDA 9 -	Soils - Only grows in wet to moist soils.
			Comments -

	Sites - 1, 2	pH: No Info.	
PLAINS	Hardiness	USDA 6 - C,	Light Requirements - Does not tolerate shade.
COTTONWOOD	USDA 3 - E, C, W	USDA 7 - C	Flood Tolerance - Flood tolerant.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Highly susceptible to drought.
	USDA 5 - E, C, W	USDA 9 -	Soils - Best in deep, loamy soils.
	Sites - 2, 3	pH: No Info.	Comments - Does not tolerate root competition.
QUAKING ASPEN	Hardiness	USDA 6 - E, C, W	Light Requirements - Intolerant of shade.
	USDA 3 - E, C, W	USDA 7 - W	Flood Tolerance - Does not tolerate flooding.
	USDA 4 - E, C, W	USDA 8 - W	Drought Tolerance - Moderate drought resistance.
	USDA 5 - E, C, W	USDA 9 -	Soils - Coarse to fine soils.
	Sites - 3, 4	pH: 4.8 - 6.5	Comments -
MED. / LARGE TREES			
COMMON NAME			
SCREWBEEAN	Hardiness	USDA 6 - W	Light Requirements - No information.
MESQUITE	USDA 3 -	USDA 7 - W	Flood Tolerance - Tolerates flooding.
	USDA 4 -	USDA 8 - W	Drought Tolerance - Grows in dry soils.
	USDA 5 -	USDA 9 -	Soils - Sand, rock & gravel.
	Sites - 1, 2, 3, 4	pH: No Info.	Comments -
BLACK CHERRY	Hardiness	USDA 6 - E, C	Light Requirements - Intolerant of shade.
	USDA 3 - E	USDA 7 - E, C	Flood Tolerance - Comments.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Drought tolerant.
	USDA 5 - E, C	USDA 9 -	Soils - Moderately coarse to moderately fine soils.
	Sites - 3, 4	pH: 6.1 - 7.5	Comments - Grows in soils with fragipan layer. D survive 10 day period of flooding.

WHITE OAK	Hardiness	USDA 6 - E	Light Requirements - Comments.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Sensitive to flooding. Comment
	USDA 4 -	USDA 8 - E	Drought Tolerance - Intermediate. Comments.
	USDA 5 - E	USDA 9 - E	Soils - Coarse to fine soils. Requires deep soil.
	Sites - 2, 3, 4	pH: 6.1 - 7.5	Comments - One study found that White Oak with 50 - 100 days of continuous flooding.

MED. / LARGE TREES

COMMON NAME

SOUTHERN	Hardiness	USDA 6 - E	Light Requirements - Intermediate shade tolerance
RED OAK	USDA 3 -	USDA 7 - E	Flood Tolerance - Up to a full season. of flooding.
	USDA 4 -	USDA 8 - E	Drought Tolerance - Drought greatly weakens health
	USDA 5 -	USDA 9 - E	Soils - Loamy soils.
	Sites - 1, 2, 3	pH: No Info.	Comments -

CHERRYBARK OAK	Hardiness	USDA 6 -	Light Requirements - Intolerant of shade.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Intolerant.
	USDA 4 -	USDA 8 - E	Drought Tolerance - Intermediate tolerance likely.
	USDA 5 -	USDA 9 - E	Soils - Doesn't grow in wet soils.
	Sites - 3	pH: Comments	Comments - May grow on Site 4 (Dry Uplands). Relatively acidic to slightly acidic soils.

SHINGLE OAK	Hardiness	USDA 6 - E	Light Requirements - Intolerant of shade.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Up to a full season of flooding.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Drought resistant.
	USDA 5 - E, C	USDA 9 -	Soils - Moderately coarse to moderately fine soils.
	Sites - 1, 2, 3, 4	pH: 4.5 - 6.0	Comments -

MED. / LARGE TREES

COMMON NAME

BUR OAK	Hardiness	USDA 6 - E, C	Light Requirements - Intermediate shade tolerance
	USDA 3 - E, C, W	USDA 7 - C	Flood Tolerance - Relatively intolerant. Comment
	USDA 4 - E, C, W	USDA 8 - C	Drought Tolerance - One of the most drought tolerant
	USDA 5 - E, C	USDA 9 - C	Soils - Grows in all soil textures, but best in clay and loam
	Sites - 3, 4	pH: 4.6 - 8.0	Comments - Reports on flood tolerance vary. Proven to tolerate up to 10 consecutive days maximum.

PIN OAK

	Hardiness	USDA 6 - E	Light Requirements - Intolerant of shade.
	USDA 3 -	USDA 7 -	Flood Tolerance - Up to an entire season. Commonly survives up to 100 days of flooding.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Resistant to drought.
	USDA 5 - E, C	USDA 9 -	Soils - Best in hard clay soils.
	Sites - 1, 2, 3, 4	pH: 5.5 - 6.5	Comments - Highly tolerant of off-season flooding.

NORTHERN

	Hardiness	USDA 6 - E, C	Light Requirements - Intermediate shade tolerance
RED OAK	USDA 3 - E	USDA 7 - E	Flood Tolerance - Does not survive 10 day flood period.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Drought tolerant. Comments.
	USDA 5 - E, C	USDA 9 -	Soils - Loamy soils and clay.
	Sites - 3, 4	pH: 4.8 - 6.5	Comments - Less drought tolerance than other Oaks. Less prone to chlorosis than Pin Oak.

MED. / LARGE TREES

COMMON NAME

LIVE OAK	Hardiness	USDA 6 -	Light Requirements - Full Sun to partial shade.
	USDA 3 -	USDA 7 -	Flood Tolerance - Tolerates flooding.
	USDA 4 -	USDA 8 - C, W	Drought Tolerance - Moderately tolerant. Tolerance is likely.
	USDA 5 -	USDA 9 - E, C	Soils - Adapts to any type of soil. Comments.
	Sites - 1, 2, 3	pH: No Info.	Comments - Grows in coastal dunes and sandy soils. Tolerates saline conditions.

TEXAS LIVE OAK	Hardiness	USDA 6 - C,	Light Requirements - Full Sun to partial shade.
	USDA 3 -	USDA 7 - C,	Flood Tolerance - Low to moderate tolerance is likely.
	USDA 4 -	USDA 8 - C, W	Drought Tolerance - Very tolerant.
	USDA 5 -	USDA 9 -	Soils - Dry, sandy soils. Limestone soils.
	Sites - 3, 4	pH: No Info.	Comments -

NEW MEXICO	Hardiness	USDA 6 - W	Light Requirements - No information.
LOCUST	USDA 3 -	USDA 7 - W	Flood Tolerance - High to moderate tolerance.
	USDA 4 -	USDA 8 - W	Drought Tolerance - Low drought tolerance is probable.
	USDA 5 - W	USDA 9 -	Soils - Grows in most soils.
	Sites - 1, 2, 3	pH: No Info.	Comments -

MED. / LARGE TREES

COMMON NAME

BLACK WILLOW	Hardiness	USDA 6 - E, C	Light Requirements - Shade intolerant.
	USDA 3 -	USDA 7 - E, C	Flood Tolerance - Beyond a full season of flooding.
	USDA 4 - E, C	USDA 8 - E, C	Drought Tolerance - Drought resistant. Comment.
	USDA 5 - E, C	USDA 9 - E, C, W	Soils - Grows in most soils.
	Sites - 1, 2, 3	pH: Above 6.5	Comments - Pioneer species on sandbars and along streams. Requires continuous moisture.

WHITE WILLOW	Hardiness	USDA 6 - E	Light Requirements - Intolerant of shade.
	USDA 3 - E	USDA 7 - E	Flood Tolerance - High flood tolerance.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Drought resistant. Comment.
	USDA 5 - E	USDA 9 - E	Soils - Grows in most soils.
	Sites - 1, 2, 3	pH: Above 6.5	Comments - Pioneer on sandbars and along streams. Requires continuous moisture.

PEACHLEAF	Hardiness	USDA 6 - E, C,	Light Requirements - Full Sun.
-----------	-----------	----------------	--------------------------------

WILLOW	USDA 3 - E, C, W USDA 4 - E, C, W USDA 5 - E, C, W Sites - 1, 2, 3	USDA 7 - E, C USDA 8 - USDA 9 - pH: Above 6.5	Flood Tolerance - Very tolerant. Drought Tolerance - Drought resistant. Comment Soils - Grows in most soils. Comments - Requires continuous moisture. Pioneer along streams and on sandbars.
--------	---	--	---

MED. / LARGE TREES

COMMON NAME

WESTERN	Hardiness	USDA 6 - E, C,	Light Requirements - No information.
SOAPBERRY	USDA 3 -	USDA 7 - E, C,	Flood Tolerance - Moderate tolerance likely.
	USDA 4 -	USDA 8 - E, C, W	Drought Tolerance - Very tolerant.
	USDA 5 - E, C	USDA 9 - E, C, W	Soils - Common in clay and limestone soils.
	Sites - 2, 3, 4	pH: No Info.	Comments -

BALD CYPRESS	Hardiness	USDA 6 - E, C	Light Requirements - Intermediate shade tolerance
	USDA 3 -	USDA 7 - E	Flood Tolerance - More than one full season.
	USDA 4 - E	USDA 8 - E, C, W	Drought Tolerance - Sensitive to drought.
	USDA 5 - E, C	USDA 9 - E, C, W	Soils - Muck, peat moss and clay to fine sand.
	Sites - 1, 2, 3	pH: 6.1 - 6.5	Comments -

NORTHERN	Hardiness	USDA 6 -	Light Requirements - Shade tolerant. Best in full
WHITE-CEDAR	USDA 3 - E, C	USDA 7 -	Flood Tolerance - Tolerates flooding.
	USDA 4 - E, C	USDA 8 -	Drought Tolerance - Does not tolerate shade.
	USDA 5 - E, C	USDA 9 -	Soils - Fine clay to moderately coarse loam.
	Sites - 1, 2, 3, 4	pH: 6.0 - 8.0	Comments - Grows best on Sites 2 and 3. Best growth occurs in calcareous soils.

MED. / LARGE TREES

COMMON NAME

AMERICAN LINDEN	Hardiness	USDA 6 - E	Light Requirements - Shade tolerant. Best in full
-----------------	-----------	------------	---

USDA 3 - E, C	USDA 7 - E	Flood Tolerance - Intolerant of flooding.
USDA 4 - E, C	USDA 8 -	Drought Tolerance - Sensitive to drought.
USDA 5 - E, C	USDA 9 -	Soils - Coarse to medium textured soils.
Sites - 3	pH: 4.5 - 7.5	Comments - Grows in calcareous soils.

CAROLINA LINDEN	Hardiness	USDA 6 - E	Light Requirements - Shade tolerant. Best in full
	USDA 3 -	USDA 7 - E	Flood Tolerance - Intolerant of flooding.
	USDA 4 -	USDA 8 - E, C, W	Drought Tolerance - Sensitive to drought.
	USDA 5 -	USDA 9 -	Soils - Coarse to medium textured soils.
Sites - 3	pH: 4.5 - 7.5		Comments - Grows in calcareous soils.

AMERICAN ELM	Hardiness	USDA 6 - E, C	Light Requirements - Grow in full Sun.
	USDA 3 - E, C, W	USDA 7 - E, C	Flood Tolerance - 90-150 days of continuous flood
	USDA 4 - E, C, W	USDA 8 - E, C	Drought Tolerance - Does not tolerate shade.
	USDA 5 - E, C	USDA 9 - E, C	Soils - Clay to loamy gravel.
Sites - 3, 4	pH: 5.5 - 8.0		Comments - Requires deep soils. Does not grow sites with high water tables.

MED. / LARGE TREES

COMMON NAME

CHINESE ELM	Hardiness	USDA 6 -	Light Requirements - No information.
	USDA 3 - E	USDA 7 -	Flood Tolerance - Low to moderate tolerance likely
	USDA 4 - E	USDA 8 -	Drought Tolerance - Resists drought.
	USDA 5 - E	USDA 9 -	Soils - Adaptable. Good choice for poor soils.
Sites - 3, 4	pH: Adaptable		Comments -

SIBERIAN ELM	Hardiness	USDA 6 - W	Light Requirements - No information.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Low to moderate tolerance likely

USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Does not tolerate shade.
USDA 5 - E, C, W	USDA 9 -	Soils - Medium to coarse textures. Organic soils.
Sites - 1, 2, 3, 4	pH: Comments	Comments - Tolerates alkaline soils.

DOWNTY	Hardiness	USDA 6 - E	Light Requirements - Full Sun to partial shade.
SERVICEBERRY	USDA 3 - E	USDA 7 - E	Flood Tolerance - Low to moderate tolerance likely.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Drought resistant.
	USDA 5 - E	USDA 9 -	Soils - Medium to coarse textures.
Sites - 1, 2, 3, 4		pH: Comments	Comments - pH requirements probably range from

ROUNDLEAF	Hardiness	USDA 6 -	Light Requirements - Full Sun to partial shade.
SERVICEBERRY	USDA 3 - E	USDA 7 -	Flood Tolerance - Intolerant.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Resists drought.
	USDA 5 -	USDA 9 -	Soils - Coarse to medium textured soils.
Sites - 3, 4		pH: 6.1 - 8.5	Comments -

SML. TREES/SHRUBS

COMMON NAME

UTAH	Hardiness	USDA 6 - W	Light Requirements - Full Sun to partial shade.
SERVICEBERRY	USDA 3 - W	USDA 7 - W	Flood Tolerance - Little or no tolerance likely.
	USDA 4 - W	USDA 8 -	Drought Tolerance - Very drought resistant.
	USDA 5 - W	USDA 9 -	Soils - Dry, rocky soils.
Sites - 3, 4		pH: Comments	Comments - Probably requires neutral to alkaline

RED CHOKEBERRY	Hardiness	USDA 6 - E	Light Requirements - Full Sun to half shade.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Very flood tolerant.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Tolerates drought.

			Comments - Grows in alkaline soils.
Sites - 3, 4	pH: Comments		
SML. TREES/SHRUBS			
COMMON NAME			
BUTTONBUSH	Hardiness	USDA 6 - E, C,	Light Requirements - Intolerant of shade.
	USDA 3 -	USDA 7 - E, C,	Flood Tolerance - Extremely tolerant.
	USDA 4 -	USDA 8 - E, C, W	Drought Tolerance - Zero drought tolerance.
	USDA 5 - E, C	USDA 9 - E, C, W	Soils - Comments.
			Comments - Grows well in the variable soils found along streams.
FLOWERING QUINC	USDA 2 -	USDA 6 -	Light Requirements - Full Sun to light shade.
	USDA 3 -	USDA 7 -	Flood Tolerance - Little or no tolerance likely.
	USDA 4 -	USDA 8 -	Drought Tolerance - Very drought tolerant.
	USDA 5 - E	USDA 9 -	Soils - No information.
			Comments - Chlorotic in alkaline soils.
PAGODA DOGWOOD	Hardiness	USDA 6 - E	Light Requirements - Full Sun to light shade.
	USDA 3 - E	USDA 7 - E	Flood Tolerance - 20-30% of the growing season.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Sensitive to drought.
	USDA 5 - E	USDA 9 -	Soils - A variety of loamy soils.
			Comments -
SITES - 1, 2, 3	pH: 6.0 - 7.5		

SML. TREES/SHRUBS			
COMMON NAME			
ROUGHLEAF	Hardiness	USDA 6 - E, C	Light Requirements - Highly tolerant of shade.
DOGWOOD	USDA 3 -	USDA 7 - E, C	Flood Tolerance - Moderate tolerance likely.
	USDA 4 - E, C	USDA 8 - C	Drought Tolerance - Very drought tolerant.
	USDA 5 - E, C	USDA 9 - W	Soils - All types. Clay to rocky soils.

Comments -

Sites - 1, 2, 3, 4 pH: No Info.

FLOWERING	Hardiness	USDA 6 - E	Light Requirements - Full Sun to part shade. Com
DOGWOOD	USDA 3 -	USDA 7 - E	Flood Tolerance - Intolerant. Comments.
	USDA 4 -	USDA 8 - E, C	Drought Tolerance - Low to moderate tolerance.
	USDA 5 - E	USDA 9 - E	Soils - Grows in a broad range of soil textures.
	Sites - 3	pH: Comments	Comments - Prefers acidic soils.

CORNELIAN CHERR	Hardiness	USDA 6 -	Light Requirements - Full Sun to partial shade.
DOGWOOD	USDA 3 -	USDA 7 -	Flood Tolerance - Moderate tolerance.
	USDA 4 -	USDA 8 -	Drought Tolerance - Moderate drought tolerance.
	USDA 5 - E	USDA 9 -	Soils - Adaptable.
	Sites - 1, 2, 3, 4	pH: 6.0 - 7.5	Comments - Adaptable to site conditions, but grow moist, well drained soils (Site 3).

SML. TREES/SHRUBS

COMMON NAME

GRAY DOGWOOD	Hardiness	USDA 6 - E	Light Requirements - Full Sun to full shade.
	USDA 3 - E, C, W	USDA 7 - E	Flood Tolerance - Moderate. 20 - 30% of growing
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Drought resistant.
	USDA 5 - E	USDA 9 -	Soils - Moderately coarse. Adapts to poor soils.
	Sites - 2, 3, 4	pH: 6.1 - 8.5	Comments -

REDTWIG	Hardiness	USDA 6 - W	Light Requirements - Intolerant of shade.
DOGWOOD	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Over 40% of the growing seaso
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Drought resistant. Comment
	USDA 5 - E, C, W	USDA 9 -	Soils - Fine clays to coarse sands and gravel.
	Sites - 1, 2, 3, 4	pH: 6.0 - 8.5	Comments - Not as drought tolerant as Gray Dog

AMERICAN FILBERT	Hardiness	USDA 6 - E	Light Requirements - Shade tolerant.
	USDA 3 - E, C	USDA 7 - E	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Intermediate tolerance.
	USDA 5 - E	USDA 9 -	Soils - Clay to gravel soils.
			Comments -
	Sites - 3, 4	pH: 6.1 - 7.5	

SML. TREES/SHRUBS

COMMON NAME

BEAKED FILBERT	Hardiness	USDA 6 -	Light Requirements - Shade tolerant.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Intolerant.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Moderate drought tolerance.
	USDA 5 -	USDA 9 -	Soils - Clay to gravel soils.
			Comments -
	Sites - 3, 4	pH: 6.1 - 7.5	

QUINCE	Hardiness	USDA 6 - E	Light Requirements - Plant in full Sun.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Probably intolerant.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Very sensitive to dry soils.
	USDA 5 - E	USDA 9 -	Soils - Deep clay loam.
			Comments - Slightly alkaline soils.
	Sites - 3	pH: Comments	

RUSSIAN-OLIVE	Hardiness	USDA 6 - E, C,	Light Requirements - Full Sun.
	USDA 3 - E, C, W	USDA 7 - E, C,	Flood Tolerance - Low to moderate tolerance likely.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Highly tolerant of drought.
	USDA 5 - E, C, W	USDA 9 -	Soils - Prefers sandy loam. Grows in most soils.
			Comments - High tolerance to alkaline soils.
	Sites - 2, 3, 4	pH: Comments	

SML. TREES/SHRUBS

COMMON NAME

SILVERBERRY	Hardiness	USDA 6 - USDA 3 - E, C, W USDA 4 - E, C, W USDA 5 - E, C, W	Light Requirements - Intolerant of shade. Flood Tolerance - Very intolerant. Drought Tolerance - Intermediate tolerance. Soils - Coarse sands and gravel to clay.
			Comments -
	Sites - 3, 4	pH: 6.1 - 8.5	
AUTUMN-OLIVE	Hardiness	USDA 6 - USDA 3 - USDA 4 - E+B180 USDA 5 - E	Light Requirements - Best in light shade. Flood Tolerance - No information. Drought Tolerance - Highly resistant. Soils - Grows in most soils. Comments.
			Comments - Tolerates low pH soils. Grows in saline soils.
	Sites - 3, 4	pH: Comments	
POSSUM HAW	Hardiness	USDA 6 - E, C USDA 7 - E, C USDA 8 - E, C USDA 9 - E, C	Light Requirements - Full Sun to light shade. Flood Tolerance - Highly tolerant. Drought Tolerance - Resistant to drought. Soils - Grows in all textures of soil.
			Comments - Tolerates alkaline soils with pH levels as 8.5.
	Sites - 1, 2, 3, 4	pH: 4.0 - 6.0	

SML. TREES/SHRUBS

COMMON NAME

MEDLAR	Hardiness	USDA 6 - E USDA 7 - E USDA 8 - E USDA 9 -	Light Requirements - Best in full Sun. Flood Tolerance - Intolerant. Drought Tolerance - Probably low to intolerant. Soils - Grows in most soils.
			Comments - Does not grow in alkaline soil. Moist required.
	Sites - 3	pH: Comments	

NINEBARK	Hardiness	USDA 6 - E	Light Requirements - Intolerant of shade.
	USDA 3 - E	USDA 7 - E	Flood Tolerance - Very tolerant. Comments.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Resists drought.
	USDA 5 - E, C	USDA 9 -	Soils - Clay to moderately coarse loam.
	Sites - 1, 2, 3, 4	pH: 6.1 - 8.5	Comments - Survives flood conditions exceeding growing season.

AMERICAN PLUM	Hardiness	USDA 6 - E, C,	Light Requirements - Intolerant of shade.
	USDA 3 - E, C, W	USDA 7 - E	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E, C, W	USDA 8 - E	Drought Tolerance - Resists drought.
	USDA 5 - E, C, W	USDA 9 - E	Soils - Deep loamy soils.
	Sites - 3, 4	pH: 6.5 - 7.5	Comments -

SML. TREES/SHRUBS

COMMON NAME

CHICKASAW PLUM	Hardiness	USDA 6 - E, C,	Light Requirements - Partial shade is best.
	USDA 3 -	USDA 7 - E, C,	Flood Tolerance - Low to moderate tolerance is lik
	USDA 4 -	USDA 8 - E, C	Drought Tolerance - Intermediate tolerance.
	USDA 5 - E, C, W	USDA 9 - E	Soils - Coarse to medium textured loams.
	Sites - 2, 3, 4	pH: No Info.	Comments -

WESTERN	Hardiness	USDA 6 - E, C	Light Requirements - Full Sun.
SANDCHERRY	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Low to moderate tolerance is lik
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Resists drought.
	USDA 5 - E, C, W	USDA 9 -	Soils - Coarse rocky soils to medium loams.
	Sites - 2, 3, 4	pH: No Info.	Comments -

NANKING CHERRY	Hardiness	USDA 6 -	Light Requirements - No information.
----------------	-----------	----------	--------------------------------------

USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - No information.
USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - No information.
USDA 5 - E, C, W	USDA 9 -	Soils - No information.
Sites - NO INFO	pH: No Info.	Comments -

SML. TREES/SHRUBS

COMMON NAME

CHOKECHERRY	Hardiness	USDA 6 - E, C	Light Requirements - Full Sun.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Resists drought.
	USDA 5 - E, C, W	USDA 9 -	Soils - Loamy soils.
Sites - 3, 4	pH: 6.5 - 7.5	Comments -	

EUROPEAN	Hardiness	USDA 6 -	Light Requirements - Full Sun to light shade.
BUCKTHORN	USDA 3 - E, C	USDA 7 -	Flood Tolerance - Moderate tolerance probable.
	USDA 4 - E, C	USDA 8 -	Drought Tolerance - Does not tolerate shade.
	USDA 5 - E, C	USDA 9 -	Soils - No information.
Sites - 1, 2, 3, 4	pH: No Info.	Comments -	

FRAGRANT SUMAC	Hardiness	USDA 6 - E, C	Light Requirements - Intolerant of shade.
	USDA 3 -	USDA 7 - E, C,	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E, C	USDA 8 - E, C, W	Drought Tolerance - Drought tolerant.
	USDA 5 - E, C	USDA 9 -	Soils - Coarsely textured, sandy or rocky soils.
Sites - 3, 4	pH: 6.1 - 8.5	Comments -	

SML. TREES/SHRUBS

COMMON NAME

SHINING SUMAC	Hardiness	USDA 6 - E	Light Requirements - Full Sun to light shade.
---------------	-----------	------------	---

	USDA 3 -	USDA 7 - E	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E	USDA 8 - E, W	Drought Tolerance - Does not tolerate shade.
	USDA 5 - E	USDA 9 -	Soils - Grows in most soils.
			Comments -
	Sites - 3, 4	pH: 6.1 - 7.0	
SMOOTH SUMAC	Hardiness	USDA 6 - E, C	Light Requirements - Full Sun to light shade.
	USDA 3 - E	USDA 7 - E, C	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E, C, W	USDA 8 - E, C	Drought Tolerance - Drought resistant.
	USDA 5 - E, C, W	USDA 9 -	Soils - Grows in any type of soil.
			Comments -
	Sites - 3, 4	pH: 5.0 - 7.0	
ALPINE CURRANT	Hardiness	USDA 6 -	Light Requirements - Full Sun to full shade. Com
	USDA 3 -	USDA 7 -	Flood Tolerance - Low tolerance probable.
	USDA 4 -	USDA 8 -	Drought Tolerance - Low to moderate tolerance.
	USDA 5 -	USDA 9 -	Soils - Grows in most soils.
			Comments - Best in light shade. Tolerates calcar
	Sites - 2, 3	pH: 6.0 - 7.5	

SML. TREES/SHRUBS

COMMON NAME

CLOVE CURRANT	Hardiness	USDA 6 - E, C,	Light Requirements - Intolerant of shade.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Drought resistant.
	USDA 5 - E, C, W	USDA 9 -	Soils - Coarse to medium textured loams.
			Comments - Grows in thin soils overlying deposits limestone or sandstone.
	Sites - 3, 4	pH: 6.1 - 8.5	
BEBB WILLOW	Hardiness	USDA 6 -	Light Requirements - Intolerant of shade.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Very tolerant of flooding.

	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Does not tolerate shade.
	USDA 5 - E, C, W	USDA 9 -	Soils - Best in rich, alluvial soils. Comments.
Sites - 1, 2, 3, 4	pH: Comments		Comments - Grows in any soil with a pH near 7.0. Recommended for high elevations.

PUSSY WILLOW	Hardiness	USDA 6 -	Light Requirements - Intolerant of shade.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Very tolerant of flooding.
	USDA 4 - E, W	USDA 8 -	Drought Tolerance - Tolerates drought.
	USDA 5 - E	USDA 9 -	Soils - Best in rich, alluvial soils. Comments.
Sites - 1, 2, 3, 4	pH: Comments		Comments - Grows in any soil with a pH near 7.0.

SML. TREES/SHRUBS

COMMON NAME

SANDBAR WILLOW	Hardiness	USDA 6 - E, C,	Light Requirements - Intolerant of shade.
	USDA 3 - E, C, W	USDA 7 - E, C,	Flood Tolerance - Extremely tolerant. Comments.
	USDA 4 - E, C, W	USDA 8 - E, C, W	Drought Tolerance - Tolerates drought.
	USDA 5 - E, C, W	USDA 9 - E, C, W	Soils - Best in rich, alluvial soils. Comments.
Sites - 1, 2, 3, 4	pH: Comments		Comments - Plant in shallow areas of stream. Gr soil with a pH near 7.0.

SLENDER WILLOW	Hardiness	USDA 6 -	Light Requirements - Intolerant of shade.
	USDA 3 - E, C	USDA 7 -	Flood Tolerance - Extremely tolerant. Comments.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Does not tolerate drought.
	USDA 5 - W	USDA 9 -	Soils - Best in rich, alluvial soils. Comments.
Sites - 1, 2	pH: Comments		Comments - Plant in shallow areas of stream. Gr soil with a pH near 7.0.

ELDERBERRY	Hardiness	USDA 6 - E, C	Light Requirements - Very shade tolerant.
	USDA 3 - E	USDA 7 - E, C	Flood Tolerance - Over 40% of the growing seao
	USDA 4 - E, C	USDA 8 - E	Drought Tolerance - Very resistant to drought.

USDA 5 - E, C	USDA 9 - E, C, W	Soils - Clay and muck to gravel.
Sites - 1, 2, 3, 4	pH: Comments	Comments - pH of 6.1 - 7.5 is ideal, but species to much broader range of values.

SML. TREES/SHRUBS

COMMON NAME

BUFFALOBERRY	Hardiness	USDA 6 -	Light Requirements - Very intolerant of shade.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Highly resistant to drought.
	USDA 5 - E, C	USDA 9 -	Soils - Moderately coarse soils. Gravelly loam.
Sites - 3, 4	pH: 6.1 - 8.5		Comments - Highly tolerant of alkaline soils.

SNOWBERRY	Hardiness	USDA 6 -	Light Requirements - Full Sun to partial shade.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Highly intolerant.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Moderate drought resistance.
	USDA 5 - E, C, W	USDA 9 -	Soils - All soil textures. Clay to gravel.
Sites - 3, 4	pH: 6.1 - 8.5		Comments - Highly adaptable to soils.

WOLFBERRY	Hardiness	USDA 6 - C,	Light Requirements - Intolerant of shade.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Drought resistant.
	USDA 5 - E, C, W	USDA 9 -	Soils - Fine to coarsely textured soils.
Sites - 3, 4	pH: 5.5 - 8.5		Comments -

SML. TREES/SHRUBS

COMMON NAME

FRENCH TAMARISK	Hardiness	USDA 6 - E, C,	Light Requirements - Full Sun.
	USDA 3 -	USDA 7 - E, C,	Flood Tolerance - Extremely tolerant.
	USDA 4 -	USDA 8 - E, C, W	Drought Tolerance - Extremely resistant.

	USDA 5 -	USDA 9 - E, C, W	Soils - Very tolerant of poor soils.
	Sites - 1, 2, 3, 4	pH: Comments	Comments - Grows in highly alkaline soils. Tolerates high salt levels.
FIVE-STAMEN	Hardiness	USDA 6 - C,	Light Requirements - Full Sun.
TAMARISK	USDA 3 - W	USDA 7 -	Flood Tolerance - Extremely tolerant.
	USDA 4 - W	USDA 8 -	Drought Tolerance - Does not tolerate shade.
	USDA 5 - C, W	USDA 9 -	Soils - Very tolerant of poor soils.
	Sites - 1, 2, 3, 4	pH: Comments	Comments - Tolerates acid soils. Grows well in soil high salt concentration.
NANNYBERRY	Hardiness	USDA 6 -	Light Requirements - Best in full Sun.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Intolerant of flooding.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Drought resistant.
	USDA 5 - E	USDA 9 -	Soils - Best in loamy soils.
	Sites - 3, 4	pH: 6.1 - 7.5	Comments -

SML. TREES/SHRUBS

COMMON NAME

AMERICAN	Hardiness	USDA 6 - E	Light Requirements - Full Sun to full shade.
CRANBERRY BUSH	USDA 3 - E	USDA 7 -	Flood Tolerance - Comments.
	USDA 4 - E	USDA 8 -	Drought Tolerance - Does not tolerate shade.
	USDA 5 - E	USDA 9 -	Soils - Moderately coarse to fine textured soils.
	Sites - 2, 3, 4	pH: 6.6 - 7.5	Comments - Survives 10 day period of flooding. Deteriorates quickly after prolonged inundation.

USDA 4 - E, C, W	USDA 8 -	Drought Tolerance - Highly resistant to drought.
USDA 5 - E, C	USDA 9 -	Soils - Adaptable. Thrives in poor soils.
Sites - 3, 4	pH: No Info.	Comments -

SML. TREES/SHRUBS

COMMON NAME

EUROPEAN ALDER	Hardiness	USDA 6 - E, C	Light Requirements - Very intolerant of shade.
	USDA 3 - E, C	USDA 7 -	Flood Tolerance - Up to a full season probable.
	USDA 4 - E, C	USDA 8 -	Drought Tolerance - Resists drought.
	USDA 5 - E, C	USDA 9 -	Soils - Silt, peat moss, muck and clays.
Sites - 1, 2, 3, 4	pH: Comments		Comments - Acidic soils are required. Growth is r neutral to alkaline soils.
SPECKLED ALDER	Hardiness	USDA 6 -	Light Requirements - Very intolerant of shade.
	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Up to a full season probable.
	USDA 4 -	USDA 8 -	Drought Tolerance - Resists drought.
	USDA 5 -	USDA 9 -	Soils - Silt, peat moss, muck and clays.
Sites - 1, 2, 3, 4	pH: Comments		Comments - Acidic soils are required. Growth is r neutral to alkaline soils.
HAZEL ALDER	Hardiness	USDA 6 - E	Light Requirements - Very intolerant of shade.
	USDA 3 -	USDA 7 - E	Flood Tolerance - Up to a full season.
	USDA 4 - E	USDA 8 - E	Drought Tolerance - Drought resistant.
	USDA 5 - E	USDA 9 - E	Soils - Silt, peat moss, muck and clays.
Sites - 1, 2, 3, 4	pH: Comments		Comments - Acidic soils are required. Growth is r neutral to alkaline soils.

SML. TREES/SHRUBS

COMMON NAME

SASKATOON	Hardiness	USDA 6 -	Light Requirements - Full Sun to partial shade.
SERVICEBERRY	USDA 3 - E, C, W	USDA 7 -	Flood Tolerance - Low to moderate tolerance likel

MED./LARGE TREES

COMMON NAME	BIRD SPECIES		ANIMALS / AQUATIC		
BOXELDER	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	
RED MAPLE	Upland Game Birds	No	Deer	Yes	Comments: Trees
	Songbirds	Yes	Fur & Game Animal	Yes	harvested for browse
	Waterbirds / Fowl	Yes	Small Mammals	Yes	should be cut after
	Birds of Prey	No	Aquatic Habitat	Yes	leaf fall.
SILVER MAPLE	Upland Game Birds	No	Deer	Yes	Comments: Cavity
	Songbirds	Yes	Fur & Game Animal	Yes	nesting sites are used
	Waterbirds / Fowl	Yes	Small Mammals	Yes	squirrels, raccoons and
	Birds of Prey	No	Aquatic Habitat	Yes	ducks.
SUGAR MAPLE	Upland Game Birds	Yes	Deer	Yes	Comments: A favorite
	Songbirds	Yes	Fur & Game Animal	Yes	source of browse for
	Waterbirds / Fowl	No	Small Mammals	Yes	deer.
	Birds of Prey	No	Aquatic Habitat	No	
YELLOW BUCKEYE	Upland Game Birds	No	Deer	No	Comments: Fruits are
	Songbirds	No	Fur & Game Animal	No	poisonous and are not
	Waterbirds / Fowl	No	Small Mammals	No	consumed by wildlife
	Birds of Prey	No	Aquatic Habitat	No	
MED./LARGE TREES					
COMMON NAME	BIRD SPECIES		ANIMALS / AQUATIC		
RIVER BIRCH	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	
WATER BIRCH	Upland Game Birds	No	Deer	No	Comments: Foliage is
	Songbirds	No	Fur & Game Animal	No	browsed by sheep and
	Waterbirds / Fowl	No	Small Mammals	No	goats.
	Birds of Prey	No	Aquatic Habitat	Yes	
PAPER BIRCH	Upland Game Birds	Yes	Deer	Yes	Comments: An important
	Songbirds	Yes	Fur & Game Animal	Yes	resource for browser

	Waterbirds / Fowl Birds of Prey	No No	Small Mammals Aquatic Habitat	Yes No	
AMERICAN HORNBEAM	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes Yes No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes No Yes	Comments: A primary food source for beavers.
BITTERNUT HICKORY	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No Yes Yes No	Comments: The bitter tasting nuts are seldom eaten by wildlife.
MED./LARGE TREES					
COMMON NAME	BIRD SPECIES		ANIMALS / AQUATIC		
PECAN	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No Yes Yes Yes	Comments:
HACKBERRY	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No No Yes Yes	Comments:
SUGARBERRY	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No Yes Yes Yes	Comments:
DESERT WILLOW	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No No No Yes	Comments: Fragrant funnel-form flowers attract hummingbirds
TURKISH FILBERT	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey		Deer Fur & Game Animal Small Mammals Aquatic Habitat		Comments: Fruits are eaten by squirrels. Limited information on wildlife users is available.
MED./LARGE TREES					
COMMON NAME	BIRD SPECIES		ANIMALS / AQUATIC		

COCKSPUR HAWTHORNE	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes No Yes No	Comments: Species be grown as shrubs which provide dense, thorny cover.
DOWNY HAWTHORNE	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes Yes No	Comments: Upland ground birds use tree for food and cover.
PERSIMMON	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes No Yes	Comments: Persimmon can form dense colonies which provide excellent cover for wildlife.
WHITE ASH	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes Yes No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes No Yes	Comments:
BLACK ASH	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes Yes No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes Yes Yes	Comments:
MED./LARGE TREES					
COMMON NAME	BIRD SPECIES		ANIMALS / AQUATIC		
GREEN ASH	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No Yes Yes No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes Yes Yes	Comments:
VELVET ASH	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No Yes No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes No Yes Yes	Comments:
ARIZONA WALNUT	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No No No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No Yes Yes Yes	Comments:

LITTLE WALNUT	Upland Game Birds	No	Deer	No	Comments: Fruits are valuable source of food for squirrels and small rodents.
	Songbirds	No	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

BLACK WALNUT	Upland Game Birds	No	Deer	Yes	Comments: Walnuts are an important food source for squirrels.
	Songbirds	No	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	

MED./LARGE TREES

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

ROCKY MOUNTAIN JUNIPER	Upland Game Birds	Yes	Deer	Yes	Comments: Trees are browsed by other hoofed animals and are often used as rubbing post.
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

EASTERN RED CEDAR	Upland Game Birds	Yes	Deer	Yes	Comments: Fruits are eaten by many birds.
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	Trees provide dense cover for nesting.
	Birds of Prey	No	Aquatic Habitat	No	

SWEETGUM	Upland Game Birds	No	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

OSAGE-ORANGE	Upland Game Birds	Yes	Deer	No	Comments: Species used primarily for cover. Bitter fruits are eaten by squirrels and quail.
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

WHITE MULBERRY	Upland Game Birds	No	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

MED./LARGE TREES

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

RED MULBERRY	Upland Game Birds	No	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	

EASTERN HOPHORNBEAM	Upland Game Birds	Yes	Deer	Yes	Comments: Fruits are important food source for upland game bird	
	Songbirds	Yes	Fur & Game Animal	Yes		
	Waterbirds / Fowl	No	Small Mammals	Yes		
	Birds of Prey	No	Aquatic Habitat	No		
AMERICAN SYCAMORE	Upland Game Birds	No	Deer	Yes	Comments:	
	Songbirds	No	Fur & Game Animal	Yes		
	Waterbirds / Fowl	Yes	Small Mammals	No		
	Birds of Prey	Yes	Aquatic Habitat	Yes		
NARROWLEAF COTTONWOOD	Upland Game Birds	Yes	Deer	No	Comments:	
	Songbirds	Yes	Fur & Game Animal	Yes		
	Waterbirds / Fowl	No	Small Mammals	No		
	Birds of Prey	No	Aquatic Habitat	Yes		
BALSAM POPLAR	Upland Game Birds	Yes	Deer	Yes	Comments: Staminated buds are eaten by ruffed grouse.	
	Songbirds	Yes	Fur & Game Animal	No		
	Waterbirds / Fowl	No	Small Mammals	No		
	Birds of Prey	No	Aquatic Habitat	Yes		
MED./LARGE TREES						
COMMON NAME		BIRD SPECIES	ANIMALS / AQUATIC			
EASTERN COTTONWOOD	Upland Game Birds	Yes	Deer	Yes	Comments:	
	Songbirds	Yes	Fur & Game Animal	Yes		
	Waterbirds / Fowl	No	Small Mammals	No		
	Birds of Prey	No	Aquatic Habitat	Yes		
FREMONT COTTONWOOD	Upland Game Birds	Yes	Deer	Yes	Comments: Horses eat bark of trees.	
	Songbirds	Yes	Fur & Game Animal	Yes		
	Waterbirds / Fowl	Yes	Small Mammals	No		
	Birds of Prey	Yes	Aquatic Habitat	Yes		
PLAINS COTTONWOOD	Upland Game Birds	Yes	Deer	Yes	Comments:	
	Songbirds	No	Fur & Game Animal	Yes		
	Waterbirds / Fowl	No	Small Mammals	No		
	Birds of Prey	No	Aquatic Habitat	No		
QUAKING ASPEN	Upland Game Birds	Yes	Deer	Yes	Comments: Trees are used by a broad variety of wildlife for food and shelter.	
	Songbirds	Yes	Fur & Game Animal	Yes		
	Waterbirds / Fowl	No	Small Mammals	Yes		

Birds of Prey	No	Aquatic Habitat	No	cover.
---------------	----	-----------------	----	--------

SCREWBEAN	Upland Game Birds	Yes	Deer	Yes	Comments:
MESQUITE	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

MED./LARGE TREES

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

BLACK CHERRY	Upland Game Birds	Yes	Deer	Yes	Comments: Trees are an important wildlife resource.
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

WHITE OAK	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

SOUTHERN RED OA	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	

CHERRYBARK OAK	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

SHINGLE OAK	Upland Game Birds	Yes	Deer	Yes	Comments: Acorns are an important food source for water fowl.
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

MED./LARGE TREES

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

BUR OAK	Upland Game Birds	No	Deer	Yes	Comments: Acorns are favored by wood duck.
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

PIN OAK	Upland Game Birds	Yes	Deer	Yes	Comments:
---------	-------------------	-----	------	-----	-----------

Songbirds	Yes	Fur & Game Animal	No
Waterbirds / Fowl	Yes	Small Mammals	Yes
Birds of Prey	No	Aquatic Habitat	Yes

NORTHERN RED O	Upland Game Birds	Yes	Deer	Yes	Comments: Deer bro
	Songbirds	Yes	Fur & Game Animal	Yes	leaves and twigs after
	Waterbirds / Fowl	No	Small Mammals	Yes	the acorns are remo
	Birds of Prey	No	Aquatic Habitat	No	

LIVE OAK	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	

TEXAS LIVE OAK	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

MED./LARGE TREES

COMMON NAME	BIRD SPECIES		ANIMALS / AQUATIC	
NEW MEXICO LOCUST	Upland Game Birds	Yes	Deer	Yes
	Songbirds	No	Fur & Game Animal	Yes
	Waterbirds / Fowl	No	Small Mammals	No
	Birds of Prey	No	Aquatic Habitat	Yes

BLACK WILLOW	Upland Game Birds	No	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

WHITE WILLOW	Upland Game Birds	No	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

PEACHLEAF WILLOW	Upland Game Birds	No	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

WESTERN SOAPBERRY	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No No No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No No No No	Comments: Wildlife the plant. Its fruits are poisonous and the leaves are inedible.
----------------------	--	----------------------	---	----------------------	--

MED./LARGE TREES

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC			
BALD CYPRESS	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes Yes Yes	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No No No Yes	Comments: Provides nesting sites for large birds of prey.

NORTHERN WHITE-CEDAR	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	No Yes Yes No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes Yes Yes	Comments: Seeds are an important food source for pine siskin.
-------------------------	--	------------------------	---	--------------------------	---

AMERICAN LINDEN	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes No No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes Yes No	Comments:
-----------------	--	-----------------------	---	-------------------------	-----------

CAROLINA LINDEN	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes No No No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes Yes No	Comments:
-----------------	--	-----------------------	---	-------------------------	-----------

AMERICAN ELM	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes Yes No	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No Yes Yes No	Comments: Elms are favored by orioles as nesting sites.
--------------	--	-------------------------	---	------------------------	---

MED./LARGE TREES

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC			
CHINESE ELM	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes	Deer Fur & Game Animal Small Mammals Aquatic Habitat	Yes Yes Yes No	Comments: Complete information on wildlif users is unavailable.
SIBERIAN ELM	Upland Game Birds Songbirds Waterbirds / Fowl Birds of Prey	Yes Yes	Deer Fur & Game Animal Small Mammals Aquatic Habitat	No	Comments: Complete information on wildlif users is unavailable.

SML. TREES/SHRUBS

COMMON NAME	BIRD SPECIES		ANIMALS / AQUATICS		
EUROPEAN ALDER	Upland Game Birds	Yes	Deer	Yes	Comments: Species recommended for us
	Songbirds	Yes	Fur & Game Animal	No	pheasant habitats.
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	
SPECKLED ALDER	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	Yes	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	
HAZEL ALDER	Upland Game Birds	No	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	Yes	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	
SASKATOON	Upland Game Birds	Yes	Deer	Yes	Comments:
SERVICEBERRY	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	
DOWNY	Upland Game Birds	Yes	Deer	Yes	Comments:
SERVICEBERRY	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	
SML. TREES/SHRUBS					
COMMON NAME	BIRD SPECIES		ANIMALS / AQUATIC		
ROUNDEAF	Upland Game Birds	Yes	Deer	Yes	Comments:
SERVICEBERRY	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	
UTAH	Upland Game Birds	Yes	Deer	Yes	Comments: Fruits ea
SERVICEBERRY	Songbirds	Yes	Fur & Game Animal	No	by ground squirrels.
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	
RED CHOKEBERRY	Upland Game Birds	Yes	Deer	Yes	Comments: Species
	Songbirds	Yes	Fur & Game Animal	Yes	heavily browsed by
	Waterbirds / Fowl	No	Small Mammals	Yes	rabbits.

	Birds of Prey	No	Aquatic Habitat	Yes
--	---------------	----	-----------------	-----

BLACK CHOKEBERRY	Upland Game Birds	Yes	Deer	Yes	Comments: Species heavily browsed by rabbits.
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

PAWPAW	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	No	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

SML. TREES/SHRUBS

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

GUM BUMELIA	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	

SIBERIAN PEASHRUB	Upland Game Birds		Deer		Comments: Information on wildlife users is unavailable.
	Songbirds		Fur & Game Animals		
	Waterbirds / Fowl		Small Mammals		
	Birds of Prey		Aquatic Habitat	No	

BUTTONBUSH	Upland Game Birds	No	Deer	Yes	Comments: Marsh birds and shore birds are the primary users along waterfowl.
	Songbirds	No	Fur & Game Animal	No	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

FLOWERING QUINC	Upland Game Birds		Deer		Comments: Information on wildlife users is not available. Species provides excellent cover.
	Songbirds		Fur & Game Animals		
	Waterbirds / Fowl		Small Mammals		
	Birds of Prey		Aquatic Habitat	No	

PAGODA DOGWOO	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	

SML. TREES/SHRUBS

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

ROUGHLEAF	Upland Game Birds	Yes	Deer	Yes	Comments: Small bir
-----------	-------------------	-----	------	-----	---------------------

DOGWOOD	Songbirds	Yes	Fur & Game Animal	No	use the plant for cov
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	

FLOWERING DOGWOOD	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

CORNELIAN CHERR DOGWOOD	Upland Game Birds		Deer		Comments: Informati
	Songbirds		Fur & Game Animals		on wildlife users is n
	Waterbirds / Fowl		Small Mammals		available.
	Birds of Prey		Aquatic Habitat	Yes	

GRAY DOGWOOD	Upland Game Birds	Yes	Deer	No	Comments: Birds qui
	Songbirds	Yes	Fur & Game Animal	Yes	consume the ripe frui
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

REDTWIG DOGWOOD	Upland Game Birds	Yes	Deer	Yes	Comments: Marsh bi
	Songbirds	No	Fur & Game Animal	Yes	and shore birds are t
	Waterbirds / Fowl	Yes	Small Mammals	No	principal users along
	Birds of Prey	No	Aquatic Habitat	Yes	waterfowl.

SML. TREES/SHRUBS

COMMON NAME	BIRD SPECIES		ANIMALS / AQUATIC		
AMERICAN FILBERT	Upland Game Birds	Yes	Deer	No	Comments: Nuts are
	Songbirds	Yes	Fur & Game Animal	No	favored by squirrels
	Waterbirds / Fowl	No	Small Mammals	Yes	blue jays.
	Birds of Prey	No	Aquatic Habitat	No	

BEAKED FILBERT	Upland Game Birds	yes	Deer	No	Comments: Nuts are
	Songbirds	yes	Fur & Game Animal	No	favored by squirrels
	Waterbirds / Fowl	No	Small Mammals	Yes	blue jays.
	Birds of Prey	No	Aquatic Habitat	No	

QUINCE	Upland Game Birds		Deer		Comments: Informati
	Songbirds		Fur & Game Animals		on wildlife users is
	Waterbirds / Fowl		Small Mammals		unavailable.
	Birds of Prey		Aquatic Habitat	No	

RUSSIAN-OLIVE	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

SILVERBERRY	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

SML. TREES/SHRUBS

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

AUTUMN-OLIVE	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

POSSUM HAW	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	Yes	

MEDLAR	Upland Game Birds		Deer		Comments: Information on wildlife users is not available.
	Songbirds		Fur & Game Animals		
	Waterbirds / Fowl		Small Mammals		
	Birds of Prey		Aquatic Habitat	No	

NINEBARK	Upland Game Birds	Yes	Deer	No	Comments: Marshbirds and shorebirds also use species.
	Songbirds	No	Fur & Game Animal	No	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

AMERICAN PLUM	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

SML. TREES/SHRUBS

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

CHICKASAW PLUM	Upland Game Birds	No	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

WESTERN SANDCHERRY	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

NANKING CHERRY	Upland Game Birds	No	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

CHOKECHERRY	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

EUROPEAN BUCKTHORN	Upland Game Birds	No	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

SML. TREES/SHRUBS

COMMON NAME BIRD SPECIES ANIMALS / AQUATIC

FRAGRANT SUMAC	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	No	
	Waterbirds / Fowl	No	Small Mammals	No	
	Birds of Prey	No	Aquatic Habitat	No	

SHINING SUMAC	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

SMOOTH SUMAC	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

ALPINE CURRANT	Upland Game Birds		Deer		Comments: Information on wildlife users is not available.
	Songbirds		Fur & Game Animals		
	Waterbirds / Fowl		Small Mammals		
	Birds of Prey		Aquatic Habitat	No	

CLOVE CURRANT	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

SML. TREES/SHRUBS

COMMON NAME BIRD SPECIES ANIMALS / AQUATIC

BEBB WILLOW	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

PUSSY WILLOW	Upland Game Birds	No	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

SANDBAR WILLOW	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

SLENDER WILLOW	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	Yes	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	Yes	

ELDERBERRY	Upland Game Birds	Yes	Deer	Yes	Comments: Elderber
	Songbirds	Yes	Fur & Game Animal	Yes	are an important foo
	Waterbirds / Fowl	No	Small Mammals	Yes	source for upland ga
	Birds of Prey	No	Aquatic Habitat	Yes	birds.

SML. TREES/SHRUBS

COMMON NAME BIRD SPECIES ANIMALS / AQUATIC

BUFFALOBERRY	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

SNOWBERRY	Upland Game Birds	Yes	Deer	No	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	

Waterbirds / Fowl	No	Small Mammals	Yes
Birds of Prey	No	Aquatic Habitat	No

WOLFBERRY	Upland Game Birds	Yes	Deer	Yes	Comments: Fruits are important food source for pheasants.
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

FRENCH TAMARISK	Upland Game Birds		Deer		Comments: Information on specific wildlife uses is unavailable. Spec
	Songbirds	Yes	Fur & Game Animals		provides excellent co
	Waterbirds / Fowl		Small Mammals	Yes	
	Birds of Prey		Aquatic Habitat	Yes	

FIVE-STAMEN TAMARISK	Upland Game Birds		Deer		Comments: Information on specific wildlife uses is unavailable. Spec
	Songbirds	Yes	Fur & Game Animals		provides excellent co
	Waterbirds / Fowl		Small Mammals	Yes	
	Birds of Prey		Aquatic Habitat	Yes	

SML. TREES/SHRUBS

COMMON NAME	BIRD SPECIES	ANIMALS / AQUATIC		
-------------	--------------	-------------------	--	--

NANNYBERRY	Upland Game Birds	Yes	Deer	Yes	Comments:
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

AMERICAN CRANBERRY BUSH	Upland Game Birds	Yes	Deer	Yes	Comments: Fruits are favored by cedar waxwings.
	Songbirds	Yes	Fur & Game Animal	Yes	
	Waterbirds / Fowl	No	Small Mammals	Yes	
	Birds of Prey	No	Aquatic Habitat	No	

WILDLIFE USERS

Wildlife users are the birds, animals and aquatic creatures which use riparian plants for food, cover and nesting sites. This table contains general information about wildlife groups which use the plants. For more specific information, see the individual Plant Descriptions.

Notes to Reviewers:

Little information is available on the following subjects. Please contribute any personal knowledge you have on these topics.

1. Trees used by birds of prey for nesting sites.
2. Specific plant use by aquatic creatures.

All trees and shrubs which grow in the Site 1 area, within and along the stream, are listed here as beneficial to aquatic species for the shade and detritus they provide.

WILDLIFE USERS

UPLAND GAME BIRDS

Doves (*Columbina & Zenaida Genera*)
Grouse (*Bonasana, Centrocerus & Tympanuchus Genera*)
Partridge (*Perdix Genus*)
Pheasant (*Phasianus Genus*)
Quail (*Callipepla, Colinus & Cyrtonyx Genera*)
Wild Turkey (*Meleagris Genus*)

SONGBIRDS

Blackbirds (*Agelaius, Euphagus & Xanthocephalus Genera*)
Bluebirds (*Sialia Genus*)
Bobolinks (*Dolichonyx Genus*)
Bunting (*Calamospiza, Guiraca, Passerina & Plectrophenax Genera*)
Cardinals (*Cardinalis Genus*)
Chickadee (*Parus Genus*)
Finches (*Carduelis & Carpodacus Genera*)
Flycatchers (*Contopus, Empidonax, Myiarchus, Pyrocephalus, Sayornis & Tyrannus Genera*)
Grackles (*Quiscalus Genus*)
Grosbeaks (*Coccothraustes, Guiraca, Pinicola & Pheucticus Genera*)
Hummingbirds (*Archilochus, Calothorax, Cynanthus, Eugenes & Lamornis Genera*)
Jays (*Aphelocoma, Cyanocitta & Perisoreus Genera*)
Juncos (*Hyemalis Genus*)
Meadowlarks (*Sturnella Genus*)
Longspurs (*Calcarius & Mccownii Genera*)
Orioles (*Icterus Genus*)
Purple Martins (*Progne Genus*)
Roadrunners (*Geococcyx Genus*)
Robins (*Turdus Genus*)
Sparrows (*Aimophila, Ammodramus, Amphispiza, Chondestes, Melospiza, Passer, Passerculus, Passerella, Pooecetes, Spizella & Zonotrichia Genera*)
Swallow (*Hirundo, Riparia, Stelgidopteryx & Tachycineta Genera*)
Tanagers (*Piranga Genus*)
Thrasher (*Oreoscoptes & Toxostoma Genera*)
Thrush (*Catharus Genus*)
Towhees (*Pipilo Genus*)
Vireos (*Vireo Genus*)
Warblers (*Regulus Genus*)
Woodpeckers (*Centurus, Dryocopus, Melanerpes, Picoides & Sphyrapicus Genera*)
Wren (*Campylorhynchus, Catherpes, Cistothorus, Salpinctes, Thryomanes & Troglodytes Genera*)

BIRDS OF PREY

Caracara (*Caracara Genus*)
Eagles (*Aquila & Haliaeetus Genera*)
Falcons (*Falco Genus*)
Hawks (*Accipiter, Buteo, Buteogallus, Circus & Parabuteo Genera*)
Kites (*Ictinia Genus*)
Owl (*Aegolius, Asio, Bubo, Glaucidium, Micrathene, Nyctea, Otus, Strix, Surnia & Tyto Genera*)

WATERBIRDS

Ducks (*Aix, Anas, Aythya, Bucephala, Dendrocygna, Lophodytes, Melanitta, Mergus, & Oxyura Genera*)
Geese (*Anser, Branta and Chen Genera*)
Grebes (*Aechmophorus, Podiceps and Podilymbus Genera*)
Gulls (*Larus Genus*)
Swans (*Cyngus Genus*)
Tern (*Chlidonias and Sterna Genera*)

FUR & GAME ANIMALS

Armadillos (*Dasypus Genus*)
Badgers (*Taxidea Genus*)
Beavers (*Castor Genus*)
Coyotes (*Canis Genus*)
Foxes (*Urocyon and Vulpes Genera*)
Muskrats (*Ondatra Genus*)
Opossums (*Didelphis Genus*)
Porcupines (*Erethizon Genus*)
Rabbits & Hares (*Lepus and Sylvilagus Genera*)
Raccoons (*Bassariscus, Nasua and Procyon Genera*)
Skunks (*Conepatus, Mephitis and Spilogale Genera*)
Squirrels (*Glaucomys and Sciurus Genera*)
Weasels (*Mustela Genus*)
Woodchucks (*Marmota Genus*)

SMALL MAMMALS

Bats (*Antrozous, Eptesicus, Lasionycteris, Lasiurus, Mormoops, Myotis, Nycticeius, Pipistrellus & Plecotus Genera*)
Chipmunks (*Tamias Genus*)
Ground Squirrels (*Spermophilis Genus*)
Moles (*Scalopus Genus*)
Pocket Gophers (*Geomys, Pappogeomys & Thomomys Genera*)
Prairie Dogs (*Cynomys Genus*)
Rats & Mice (*Baiomys, Clethrionomys, Dipodomys, Lagurus, Microtus, Neotoma, Ochrotomys, Onychomys, Oryzomys, Perognathus, Peromyscus, Reithrodontomys & Sigmodon Genera*)
Shrews (*Blarina, Cryptotis, Microsorex, Notiosorex & Sorex Genera*)

HOOFED BROWSERS

Antelope (*Antilocapra Genus*)
Deer (*Alces, Cervus, Odocoileus & Rangifer Genera*)

AQUATIC

Fish (*Multiple Genera*)
Amphibians (*Anura and Urodea Orders*)
Reptiles (*Lizards, Snakes and Turtles*)

MED./LARGE TREES

COMMON NAME

BOXELDER	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No Unique Uses:
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - Yes
Wine -	No	Flooring -	No	Pallets - Yes
Syrup -	Yes	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - Yes Firewood Quality: Fair
RED MAPLE	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	Yes	Lumber - No Unique Uses: Furniture Frames
Baked Goods	No	Veneers -	Yes	Posts - No
Jellies -	No	Furniture -	No	Crates - Yes
Wine -	No	Flooring -	No	Pallets - Yes
Syrup -	Yes	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	Yes	Pulp - Yes Firewood Quality: Excellent
SILVER MAPLE	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	Yes	Lumber - No Unique Uses: Furniture Frames
Baked Goods	No	Veneers -	Yes	Posts - Yes
Jellies -	No	Furniture -	No	Crates - Yes
Wine -	No	Flooring -	No	Pallets - No
Syrup -	Yes	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - Yes Firewood Quality: Fair
MED./LARGE TREES	FOOD PRODS.	WOOD PRODS.		
COMMON NAME	FOOD PRODS.	WOOD PRODS.		
SUGAR MAPLE	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - Yes Unique Uses: Railroad Ties, Ch
Baked Goods	No	Veneers -	Yes	Posts - No Sporting Goods, Musical Instru
Jellies -	No	Furniture -	Yes	Crates - Yes
Wine -	No	Flooring -	Yes	Pallets - Yes
Syrup -	Yes	Cabinetry -	No	Handles - Yes
Honey -	No	Millwork -	Yes	Pulp - Yes Firewood Quality: Excellent
YELLOW BUCKEYE	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No Unique Uses: Boxes, Drawing
Baked Goods	No	Veneers -	No	Posts - No Trunks, Furniture Frames
Jellies -	No	Furniture -	No	Crates - Yes
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - No Firewood Quality: Fair

RIVER BIRCH	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	Yes	Crates - Yes
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	Yes	Handles - Yes
Honey -	No	Millwork -	Yes	Pulp - Yes
				Unique Uses: Cooperage
				Firewood Quality: Fair

MED./LARGE TREES

COMMON NAME

WATER BIRCH	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - Yes
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - No
				Unique Uses:
				Firewood Quality: Fair

PAPER BIRCH	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	Yes	Crates - Yes
Wine -	No	Flooring -	No	Pallets - No
Syrup -	Yes	Cabinetry -	Yes	Handles - No
Honey -	No	Millwork -	Yes	Pulp - Yes
				Unique Uses: Paper Production
				Cooperage
				Firewood Quality: Fair

AMERICAN HORNBEAM	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - Yes
Honey -	No	Millwork -	No	Pulp - No
				Unique Uses:
				Firewood Quality: Excellent

MED./LARGE TREES

COMMON NAME

BITTERNUT HICKORY	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	Yes	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No

Jellies -	No	Furniture -	Yes	Crates -	Yes	
Wine -	No	Flooring -	Yes	Pallets -	Yes	
Syrup -	No	Cabinetry -	No	Handles -	Yes	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

PECAN

FOOD PRODS.		WOOD PRODS.				
Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	Yes	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	Yes	Pallets -	No	
Syrup -	No	Cabinetry -	Yes	Handles -	Yes	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

HACKBERRY

FOOD PRODS.		WOOD PRODS.				
Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Furniture Frames
Baked Goods	No	Veneers -	Yes	Posts -	Yes	Sporting Goods, Boxes
Jellies -	No	Furniture -	Yes	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	Yes	Pulp -	No	Firewood Quality: Good

MED./LARGE TREES

COMMON NAME

SUGARBERRY

FOOD PRODS.		WOOD PRODS.				
Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Furniture Frames
Baked Goods	No	Veneers -	Yes	Posts -	Yes	Sporting Goods, Boxes
Jellies -	No	Furniture -	Yes	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	Yes	Pulp -	No	Firewood Quality: Good

DESERT WILLOW

FOOD PRODS.		WOOD PRODS.				
Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

TURKISH FILBERT

FOOD PRODS.		WOOD PRODS.				
Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses:

Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Good

MED./LARGE TREES

COMMON NAME

COCKSPUR
HAWTHORNE

FOOD PRODS.		WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - No

Unique Uses: Firewood Quality: Fair

DOWNTY
HAWTHORNE

FOOD PRODS.		WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - No

Unique Uses: Firewood Quality: Good

PERSIMMON

FOOD PRODS.		WOOD PRODS.		
Fruit / Nuts -	Yes	Panelling -	No	Lumber - No
Baked Goods	Yes	Veneers -	Yes	Posts - No
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	Yes	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - Yes
Honey -	Yes	Millwork -	No	Pulp - No

Unique Uses: Golf Club Heads, Can Be Used As Hog Food
Firewood Quality: Excellent

MED./LARGE TREES

COMMON NAME

WHITE ASH

FOOD PRODS.		WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	Yes	Lumber - No
Baked Goods	No	Veneers -	Yes	Posts - No
Jellies -	No	Furniture -	Yes	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	Yes	Handles - Yes
Honey -	No	Millwork -	Yes	Pulp - No

Unique Uses: Baseball Bats, O Boxes, Baskets
Firewood Quality: Excellent

BLACK ASH	FOOD PRODS.		WOOD PRODS.		Unique Uses: Baskets Firewood Quality: Good	
	Fruit / Nuts -	No	Panelling -	No		
	Baked Goods	No	Veneers -	Yes		
	Jellies -	No	Furniture -	Yes		
	Wine -	No	Flooring -	No		
	Syrup -	No	Cabinetry -	Yes		
	Honey -	No	Millwork -	Yes		
GREEN ASH	FOOD PRODS.		WOOD PRODS.		Unique Uses: Athletic Goods, B Firewood Quality: Excellent	
	Fruit / Nuts -	No	Panelling -	No		
	Baked Goods	No	Veneers -	Yes		
	Jellies -	No	Furniture -	Yes		
	Wine -	No	Flooring -	No		
	Syrup -	No	Cabinetry -	Yes		
	Honey -	No	Millwork -	No		
MED./LARGE TREES						
COMMON NAME						
VELVET ASH	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Excellent	
	Fruit / Nuts -	No	Panelling -	No		
	Baked Goods	No	Veneers -	No		
	Jellies -	No	Furniture -	No		
	Wine -	No	Flooring -	No		
	Syrup -	No	Cabinetry -	No		
	Honey -	No	Millwork -	No		
ARIZONA WALNUT						
FOOD PRODS.		WOOD PRODS.				
ARIZONA WALNUT	Fruit / Nuts -	Yes	Panelling -	No	Unique Uses: Gunstocks Firewood Quality: Excellent	
	Baked Goods	Yes	Veneers -	Yes		
	Jellies -	No	Furniture -	Yes		
	Wine -	No	Flooring -	No		
	Syrup -	No	Cabinetry -	No		
	Honey -	No	Millwork -	No		
LITTLE WALNUT	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Excellent	
	Fruit / Nuts -	No	Panelling -	Yes		
	Baked Goods	No	Veneers -	Yes		
	Jellies -	No	Furniture -	Yes		
	Wine -	No	Flooring -	No		
	Syrup -	No	Cabinetry -	Yes		
	Honey -	No	Millwork -	No		

MED./LARGE TREES

COMMON NAME

BLACK WALNUT FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	Yes	Lumber -	No	Unique Uses: Gunstocks, Abras
Baked Goods	Yes	Veneers -	Yes	Posts -	Yes	Caskets/Coffins, Piano Cases
Jellies -	No	Furniture -	Yes	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	Yes	Handles -	No	
Honey -	No	Millwork -	Yes	Pulp -	No	Firewood Quality: Excellent

ROCKY MOUNTAIN FOOD PRODS. WOOD PRODS.

JUNIPER

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Closet Linings, C
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	Yes	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

EASTERN RED FOOD PRODS. WOOD PRODS.

CEDAR

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Perfumes, Christ
Baked Goods	No	Veneers -	No	Posts -	Yes	Trees, Cedar Chests, Closet Lin
Jellies -	No	Furniture -	No	Crates -	No	Cleaning Products
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	Yes	Pulp -	No	Firewood Quality: Fair

MED./LARGE TREES

COMMON NAME

SWEETGUM FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	Yes	Unique Uses: Railroad Ties
Baked Goods	No	Veneers -	Yes	Posts -	No	
Jellies -	No	Furniture -	Yes	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	Yes	Handles -	No	
Honey -	No	Millwork -	Yes	Pulp -	Yes	Firewood Quality: Good

OSAGE-ORANGE FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Archery Bows, Cr
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	No	Crates -	No	

Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

WHITE MULBERRY FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses: Carving
Baked Goods	Yes	Veneers -	No	Posts -	Yes	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	Yes	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

MED./LARGE TREES

COMMON NAME

RED MULBERRY

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses: Cooperage, Cask
Baked Goods	Yes	Veneers -	No	Posts -	Yes	
Jellies -	Yes	Furniture -	Yes	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

EASTERN HOPHORNBEAM

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Mallets, Canes
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	Yes	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	Yes	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

AMERICAN SYCAMORE

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	Yes	Lumber -	Yes	Unique Uses: Butcher's Blocks, Cooperage, Boxes
Baked Goods	No	Veneers -	Yes	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	Yes	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	Yes	Pulp -	Yes	Firewood Quality: Good

MED./LARGE TREES

COMMON NAME

NARROWLEAF

FOOD PRODS.

WOOD PRODS.

SYCAMORE

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Baskets
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

BALSAM POPLAR

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	Yes	Unique Uses: Furniture Frames
Baked Goods	No	Veneers -	Yes	Posts -	No	Boxes, Excelsior, Carving
Jellies -	No	Furniture -	No	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	Yes	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	Yes	Firewood Quality: Fair

EASTERN COTTONWOOD

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	Yes	Unique Uses: Furniture Frames
Baked Goods	No	Veneers -	No	Posts -	No	Boxes, Excelsior
Jellies -	No	Furniture -	No	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	Yes	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	Yes	Firewood Quality: Fair

MED./LARGE TREES

COMMON NAME

FREMONT COTTONWOOD

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Carving (Roots)
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

PLAINS COTTONWOOD

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	Yes	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	No	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

QUAKING ASPEN	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - Yes
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - Yes
Wine -	No	Flooring -	No	Pallets - Yes
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - Yes
				Unique Uses: Excelsior, Process Animal Food, Particle Board
				Firewood Quality: Fair

MED./LARGE TREES

COMMON NAME

SCREWBEAN MESQUITE	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	Yes	Veneers -	No	Posts - Yes
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	Yes	Cabinetry -	No	Handles - Yes
Honey -	No	Millwork -	No	Pulp - No
				Unique Uses: Fruits Pods Are Edible
				Firewood Quality: Excellent

BLACK CHERRY

BLACK CHERRY	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	Yes	Posts - No
Jellies -	Yes	Furniture -	Yes	Crates - No
Wine -	Yes	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - Yes
Honey -	No	Millwork -	Yes	Pulp - No
				Unique Uses: Interior Plywood
				Firewood Quality: Good

WHITE OAK

WHITE OAK	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	Yes	Lumber - Yes
Baked Goods	No	Veneers -	Yes	Posts - Yes
Jellies -	No	Furniture -	Yes	Crates - Yes
Wine -	No	Flooring -	Yes	Pallets - Yes
Syrup -	No	Cabinetry -	Yes	Handles - Yes
Honey -	No	Millwork -	Yes	Pulp - Yes
				Unique Uses: Pilings, Barrels, Railroad Ties, Mine Timbers, Coffins
				Firewood Quality: Excellent

MED./LARGE TREES

COMMON NAME

SOUTHERN RED OAK	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - Yes
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - Yes
Wine -	No	Flooring -	No	Pallets - Yes
Syrup -	No	Cabinetry -	No	Handles - No
				Unique Uses:

Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent
---------	----	------------	----	--------	----	-----------------------------

CHERRYBARK OA FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	Yes	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

SHINGLE OAK FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Wooden Shingles
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

MED./LARGE TREES

COMMON NAME

BUR OAK FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	Yes	Lumber -	Yes	Unique Uses: Boat Decks, Railr
Baked Goods	No	Veneers -	Yes	Posts -	Yes	Ties, Caskets, Coffins, Boxes
Jellies -	No	Furniture -	Yes	Crates -	Yes	
Wine -	No	Flooring -	Yes	Pallets -	Yes	
Syrup -	No	Cabinetry -	Yes	Handles -	Yes	
Honey -	No	Millwork -	Yes	Pulp -	Yes	Firewood Quality: Excellent

PIN OAK FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	Yes	Lumber -	Yes	Unique Uses: Railroad Ties, Ca
Baked Goods	No	Veneers -	Yes	Posts -	Yes	Coffins, Boxes, Furniture Frame
Jellies -	No	Furniture -	Yes	Crates -	Yes	Mine Timbers
Wine -	No	Flooring -	Yes	Pallets -	Yes	
Syrup -	No	Cabinetry -	Yes	Handles -	Yes	
Honey -	No	Millwork -	Yes	Pulp -	Yes	Firewood Quality: Excellent

NORTHERN RED OAK FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	Yes	Lumber -	Yes	Unique Uses: Railroad Ties, Pili
Baked Goods	No	Veneers -	Yes	Posts -	Yes	Ship Building, Mine Timbers, Ca
Jellies -	No	Furniture -	Yes	Crates -	Yes	Coffins, Boxes
Wine -	No	Flooring -	Yes	Pallets -	Yes	

Syrup -	No	Cabinetry -	Yes	Handles -	Yes	
Honey -	No	Millwork -	Yes	Pulp -	Yes	Firewood Quality: Excellent

MED./LARGE TREES

COMMON NAME

LIVE OAK FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses: Formerly Used In Building, Structural Beams
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

TEXAS LIVE OAK FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

NEW MEXICO LOCUST FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Excellent

MED./LARGE TREES

COMMON NAME

BLACK WILLOW FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Charcoal, Casket Boxes
Baked Goods	No	Veneers -	Yes	Posts -	No	
Jellies -	No	Furniture -	Yes	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	Yes	Millwork -	No	Pulp -	Yes	Firewood Quality: Poor

WHITE WILLOW FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Baskets
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	Yes	Millwork -	No	Pulp -	No	Firewood Quality: Poor

PEACHLEAF
WILLOW

FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No
Baked Goods	No	Veneers -	No
Jellies -	No	Furniture -	No
Wine -	No	Flooring -	No
Syrup -	No	Cabinetry -	No
Honey -	Yes	Millwork -	No

Unique Uses: Charcoal

Firewood Quality: Poor

MED./LARGE TREES

COMMON NAME

WESTERN
SOAPBERRY

FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No
Baked Goods	No	Veneers -	No
Jellies -	No	Furniture -	No
Wine -	No	Flooring -	No
Syrup -	No	Cabinetry -	No
Honey -	No	Millwork -	No

Unique Uses: Seeds Are Made
Necklaces And Buttons

Firewood Quality: Excellent

BALD CYPRESS

FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No
Baked Goods	No	Veneers -	No
Jellies -	No	Furniture -	No
Wine -	No	Flooring -	Yes
Syrup -	No	Cabinetry -	Yes
Honey -	No	Millwork -	Yes

Unique Uses: Railroad Ties, Do
Bridge Beams, Tanks, Coopera
Caskets, Coffins

Firewood Quality: Good

NORTHERN
WHITE-CEDAR

FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No
Baked Goods	No	Veneers -	No
Jellies -	No	Furniture -	No
Wine -	No	Flooring -	No
Syrup -	No	Cabinetry -	No
Honey -	No	Millwork -	No

Unique Uses: Wooden Shingles
Perfumes, Floral Displays, Boat
Building

Firewood Quality: Fair

MED./LARGE TREES

COMMON NAME

AMERICAN LINDEN FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	Yes	Unique Uses: Carving, Cooperage
Baked Goods	No	Veneers -	Yes	Posts -	No	Boxes, Caskets, Coffins
Jellies -	No	Furniture -	Yes	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	Yes	Handles -	No	
Honey -	Yes	Millwork -	Yes	Pulp -	Yes	Firewood Quality: Fair

CAROLINA LINDEN FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	Yes	Unique Uses: Carving, Cooperage
Baked Goods	No	Veneers -	Yes	Posts -	No	Boxes, Caskets, Coffins
Jellies -	No	Furniture -	Yes	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	Yes	Handles -	No	
Honey -	Yes	Millwork -	Yes	Pulp -	Yes	Firewood Quality: Fair

AMERICAN ELM

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	Yes	Lumber -	Yes	Unique Uses: Cooperage, Boxes
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	Yes	Crates -	Yes	
Wine -	No	Flooring -	No	Pallets -	Yes	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	Yes	Pulp -	Yes	Firewood Quality: Fair

MED./LARGE TREES

COMMON NAME

CHINESE ELM

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

SIBERIAN ELM

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

SM. TREES/SHRUBS

COMMON NAME

EUROPEAN ALDER FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

SPECKLED ALDER FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

HAZEL ALDER

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

SM. TREES/SHRUBS

COMMON NAME

SASKATOON
SERVICEBERRY

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	Yes	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	Yes	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Good

DOWNY
SERVICEBERRY

FOOD PRODS.

WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	Yes	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	

Syrup - Honey -	No No	Cabinetry - Millwork -	No No	Handles - Pulp -	Yes No	Firewood Quality: Good
--------------------	----------	---------------------------	----------	---------------------	-----------	------------------------

ROUNDLEAF
SERVICEBERRY

	FOOD PRODS.	WOOD PRODS.			
Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No
Baked Goods	Yes	Veneers -	No	Posts -	No
Jellies -	Yes	Furniture -	No	Crates -	No
Wine -	No	Flooring -	No	Pallets -	No
Syrup -	No	Cabinetry -	No	Handles -	Yes
Honey -	No	Millwork -	No	Pulp -	No

Unique Uses:

Firewood Quality: Good

SM. TREES/SHRUBS

COMMON NAME

UTAH
SERVICEBERRY

	FOOD PRODS.	WOOD PRODS.			
Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No
Baked Goods	Yes	Veneers -	No	Posts -	No
Jellies -	Yes	Furniture -	No	Crates -	No
Wine -	No	Flooring -	No	Pallets -	No
Syrup -	No	Cabinetry -	No	Handles -	Yes
Honey -	No	Millwork -	No	Pulp -	No

Unique Uses:

Firewood Quality: Good

RED
CHOKEBERRY

	FOOD PRODS.	WOOD PRODS.			
Fruit / Nuts -	No	Panelling -	No	Lumber -	No
Baked Goods	No	Veneers -	No	Posts -	No
Jellies -	Yes	Furniture -	No	Crates -	No
Wine -	No	Flooring -	No	Pallets -	No
Syrup -	No	Cabinetry -	No	Handles -	No
Honey -	No	Millwork -	No	Pulp -	No

Unique Uses:

Firewood Quality: Not Suitable

BLACK
CHOKEBERRY

	FOOD PRODS.	WOOD PRODS.			
Fruit / Nuts -	No	Panelling -	No	Lumber -	No
Baked Goods	No	Veneers -	No	Posts -	No
Jellies -	Yes	Furniture -	No	Crates -	No
Wine -	No	Flooring -	No	Pallets -	No
Syrup -	No	Cabinetry -	No	Handles -	No
Honey -	No	Millwork -	No	Pulp -	No

Unique Uses:

Firewood Quality: Not Suitable

SM. TREES/SHRUBS

COMMON NAME

PAWPAW

	FOOD PRODS.	WOOD PRODS.			
Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No
Baked Goods	No	Veneers -	No	Posts -	No

Unique Uses:

Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Poor

GUM BUMELIA	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Fair
	Fruit / Nuts -	No	Panelling -	No	
	Baked Goods	No	Veneers -	No	Posts - No
	Jellies -	No	Furniture -	No	Crates - No
	Wine -	No	Flooring -	No	Pallets - No
	Syrup -	No	Cabinetry -	Yes	Handles - Yes
	Honey -	No	Millwork -	No	Pulp - No

SM. TREES/SHRUBS

COMMON NAME

BUTTONBUSH	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Fair
	Fruit / Nuts -	No	Panelling -	No	
	Baked Goods	No	Veneers -	No	Posts - No
	Jellies -	No	Furniture -	No	Crates - No
	Wine -	No	Flooring -	No	Pallets - No
	Syrup -	No	Cabinetry -	No	Handles - No
	Honey -	Yes	Millwork -	No	Pulp - No

FLOWERING QUINCE

FLOWERING QUINCE	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Not Suitable
	Fruit / Nuts -	No	Panelling -	No	
	Baked Goods	No	Veneers -	No	Posts - No
	Jellies -	Yes	Furniture -	No	Crates - No
	Wine -	No	Flooring -	No	Pallets - No
	Syrup -	No	Cabinetry -	No	Handles - No
	Honey -	No	Millwork -	No	Pulp - No

PAGODA DOGWOOD

PAGODA DOGWOOD	FOOD PRODS.		WOOD PRODS.		Unique Uses:
	Fruit / Nuts -	No	Panelling -	No	

Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Good

SM. TREES/SHRUBS

COMMON NAME

ROUGHLEAF DOGWOOD	FOOD PRODS.		WOOD PRODS.		Unique Uses: Charcoal Firewood Quality: Good	
	Fruit / Nuts -	No	Panelling -	No	Lumber -	No
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	

FLOWERING DOGWOOD	FOOD PRODS.		WOOD PRODS.		Unique Uses: Pulleys, Spools, Club Heads Firewood Quality: Excellent	
	Fruit / Nuts -	No	Panelling -	No	Lumber -	No
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	Yes	
Honey -	No	Millwork -	No	Pulp -	No	

CORNELIAN CHERRY DOGWOOD	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Not Suitable	
	Fruit / Nuts -	No	Panelling -	No	Lumber -	No
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	

SM. TREES/SHRUBS

COMMON NAME

GRAY DOGWOOD	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Not Suitable	
	Fruit / Nuts -	No	Panelling -	No	Lumber -	No
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	

REDTWIG DOGWOOD	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Not Suitable
	Fruit / Nuts -	No	Panelling -	No	
	Baked Goods	No	Veneers -	No	
	Jellies -	No	Furniture -	No	
	Wine -	No	Flooring -	No	
	Syrup -	No	Cabinetry -	No	
	Honey -	No	Millwork -	No	
AMERICAN FILBER FOOD PRODS.		WOOD PRODS.			
AMERICAN FILBER FOOD PRODS.	Fruit / Nuts -	Yes	Panelling -	No	Unique Uses: Firewood Quality: Not Suitable
	Baked Goods	No	Veneers -	No	
	Jellies -	No	Furniture -	No	
	Wine -	No	Flooring -	No	
	Syrup -	No	Cabinetry -	No	
	Honey -	No	Millwork -	No	
SM. TREES/SHRUBS					
COMMON NAME					
BEAKED FILBERT	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Not Suitable
	Fruit / Nuts -	Yes	Panelling -	No	
	Baked Goods	No	Veneers -	No	
	Jellies -	No	Furniture -	No	
	Wine -	No	Flooring -	No	
	Syrup -	No	Cabinetry -	No	
	Honey -	No	Millwork -	No	
QUINCE		FOOD PRODS.		WOOD PRODS.	
QUINCE	Fruit / Nuts -	No	Panelling -	No	Unique Uses: Firewood Quality: Good
	Baked Goods	Yes	Veneers -	No	
	Jellies -	Yes	Furniture -	No	
	Wine -	Yes	Flooring -	No	
	Syrup -	No	Cabinetry -	No	
	Honey -	No	Millwork -	No	
RUSSIAN-OLIVE		FOOD PRODS.		WOOD PRODS.	
RUSSIAN-OLIVE	Fruit / Nuts -	Yes	Panelling -	No	Unique Uses: Firewood Quality: Fair
	Baked Goods	No	Veneers -	No	
	Jellies -	Yes	Furniture -	No	
	Wine -	No	Flooring -	No	
	Syrup -	No	Cabinetry -	No	
	Honey -	No	Millwork -	No	

SM. TREES/SHRUBS

COMMON NAME

SILVERBERRY FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable

AUTUMN-OLIVE FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	Yes	Millwork -	No	Pulp -	No	Firewood Quality: Fair

POSSUM HAW FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Christmas Decor
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Good

SM. TREES/SHRUBS

COMMON NAME

MEDLAR FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	Yes	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable

NINEBARK FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	

Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable

AMERICAN PLUM FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	Yes	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Poor

SM. TREES/SHRUBS

COMMON NAME

CHICKASAW PLUM FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Poor

WESTERN SANDCHERRY

FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable

NANKING CHERRY FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	Yes	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable

SM. TREES/SHRUBS

COMMON NAME

CHOKECHERRY FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	Yes	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	Yes	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Poor

EUROPEAN
BUCKTHORN

	FOOD PRODS.	WOOD PRODS.				
Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

FAGRANT SUMA FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Basketry
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable

SM. TREES/SHRUBS

COMMON NAME

SHINING SUMAC FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	Yes	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Fair

SMOOTH SUMAC FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Poor

ALPINE CURRANT	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - No
				Unique Uses: Firewood Quality: Not Suitable

SM. TREES/SHRUBS

COMMON NAME

CLOVE CURRANT	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - No
				Unique Uses: Firewood Quality: Not Suitable

BEBB WILLOW

BEBB WILLOW	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	Yes	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - No
				Unique Uses: Basketry, Bats, C Lamp Posts Firewood Quality: Poor

PUSSY WILLOW

PUSSY WILLOW	FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No	Lumber - No
Baked Goods	No	Veneers -	No	Posts - No
Jellies -	No	Furniture -	No	Crates - No
Wine -	No	Flooring -	No	Pallets - No
Syrup -	No	Cabinetry -	No	Handles - No
Honey -	No	Millwork -	No	Pulp - No
				Unique Uses: Floral Displays Firewood Quality: Not Suitable

SM. TREES/SHRUBS

COMMON NAME

SANDBAR WILLOW FOOD PRODS.

SANDBAR WILLOW FOOD PRODS.	WOOD PRODS.		
Fruit / Nuts -	No	Panelling -	No
Baked Goods	No	Veneers -	No
Jellies -	No	Furniture -	No
Wine -	No	Flooring -	No
Syrup -	No	Cabinetry -	No
			Unique Uses: Basketry
			Handles - No
			Pallets - No
			Crates - No
			Posts - No
			Basketry

Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable
---------	----	------------	----	--------	----	--------------------------------

SLENDER WILLOW FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses: Basketry
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Poor

ELDERBERRY FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	Yes	Panelling -	No	Lumber -	No	Unique Uses: Edible Flowers U
Baked Goods	No	Veneers -	No	Posts -	No	Make Wine, Jellies & Candy
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	Yes	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Poor

SM. TREES/SHRUBS

COMMON NAME

BUFFALO BERRY FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	Yes	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Poor

SNOWBERRY FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	
Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	No	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable

WOLFBERRY FOOD PRODS. WOOD PRODS.

Fruit / Nuts -	No	Panelling -	No	Lumber -	No	Unique Uses:
Baked Goods	No	Veneers -	No	Posts -	No	
Jellies -	No	Furniture -	No	Crates -	No	
Wine -	No	Flooring -	No	Pallets -	No	

Syrup -	No	Cabinetry -	No	Handles -	No	
Honey -	Yes	Millwork -	No	Pulp -	No	Firewood Quality: Not Suitable

SM. TREES/SHRUBS

COMMON NAME

FRENCH TAMARISK	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Fair	
	Fruit / Nuts -	No	Panelling -	No	Lumber -	No
	Baked Goods	No	Veneers -	No	Posts -	No
	Jellies -	No	Furniture -	No	Crates -	No
	Wine -	No	Flooring -	No	Pallets -	No
	Syrup -	No	Cabinetry -	No	Handles -	No
	Honey -	No	Millwork -	No	Pulp -	No

FIVE-STAMEN TAMARISK	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Not Suitable	
	Fruit / Nuts -	No	Panelling -	No	Lumber -	No
	Baked Goods	No	Veneers -	No	Posts -	No
	Jellies -	No	Furniture -	No	Crates -	No
	Wine -	No	Flooring -	No	Pallets -	No
	Syrup -	No	Cabinetry -	No	Handles -	No
	Honey -	Yes	Millwork -	No	Pulp -	No

NANNYBERRY	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Fair	
	Fruit / Nuts -	No	Panelling -	No	Lumber -	No
	Baked Goods	No	Veneers -	No	Posts -	No
	Jellies -	No	Furniture -	No	Crates -	No
	Wine -	No	Flooring -	No	Pallets -	No
	Syrup -	No	Cabinetry -	No	Handles -	No
	Honey -	No	Millwork -	No	Pulp -	No

SM. TREES/SHRUBS

COMMON NAME

AMERICAN CRANBERRY BUSH	FOOD PRODS.		WOOD PRODS.		Unique Uses: Firewood Quality: Not Suitable	
	Fruit / Nuts -	No	Panelling -	No	Lumber -	No
	Baked Goods	No	Veneers -	No	Posts -	No
	Jellies -	Yes	Furniture -	No	Crates -	No
	Wine -	Yes	Flooring -	No	Pallets -	No
	Syrup -	No	Cabinetry -	No	Handles -	No
	Honey -	No	Millwork -	No	Pulp -	No

FOOD PRODS. WOOD PRODS.

BOXELDER

(ACER NEGUNDO)

HEIGHT/SPREAD/DBH The height of a fully grown Boxelder is 50 - 75' (15 - 23 m), and its spread is roughly equivalent to the height. An adult specimen's diameter (DBH) is 2 - 3' (0.6 - 1.0 m).

FORM The tree has a dense, irregular crown on a single, short bole or multiple stems.

FOLIAGE The Summer leaves are bright green to yellow green with pale undersides. Boxelder leaves have a dull yellow color in Autumn, and it is one of the earliest Maples to turn color. The leaves emerge in mid/late April, and fall in late September/early October.

FLOWER *Acer negundo* is a dioecious species. The inconspicuous yellow green flowers bloom before or during leaf emergence. They can be used to identify male plants for vegetative propagation and distribution in riparian areas.

FRUIT The fruits are paired samaras that mature between mid-July and October. The fruits persist and are dispersed by the wind, through the following Spring. The trees begin seed production as early as the age of 8.

RANGE Boxelder has the widest range of any North American maple. It grows from central Manitoba and Saskatchewan, down through the eastern half of Texas and is found in all the states of the Great Plains.

MOISTURE REQUIREMENTS Boxelder grows under a very wide variety of moisture regimes. It does best in wet to moist soils along streams and survives up to 30 consecutive days of inundation. Boxelder is also found in soils which receive little moisture, and it is extremely drought resistant.

GROWTH RATE/LIFESPAN The tree grows very rapidly during its first twenty years, growing as much as 20' (6 m) in a 5 year period. The plant is short-lived and its growth rate slows after age 20. Boxelder reaches maturity by age 50, and rarely live past 60.

DISEASES/INSECTS Boxelders are subject to frequent disease and insect problems, most notably verticillium wilt. Boxelder is also susceptible to numerous rot-causing fungi. Although it is attacked by many insect species, Boxelder is not greatly damaged by any of them.

OTHER DAMAGING AGENTS Boxelder wood is weak, due to the plant's accelerated growth rate. The tree is highly susceptible to wind and ice damage, and broken limbs occur frequently. Due to its thin bark, Boxelder is easily damaged by fire and mechanical injuries. The tree is also extremely sensitive to 2, 4-D drifts from as far as 10 miles (16 km) away.

ROOT SYSTEM The plant usually has a shallow, fibrous root system, but may develop a taproot in deep soils. The tree has been used for erosion control due to its fast growth and fibrous root system.

HABITAT Boxelder is most commonly found along streams, but also occurs in fence lines, ditches and on dry upland sites. It has been observed at elevations as high as 8,000' (2438 m).

SOIL REQUIREMENTS Boxelders have fairly minimal soil demands. They grow in soil textures ranging from coarse to fine, and are found in Entisol, Inceptisol, Alfisol, Ultisol and Mollisol soils. Boxelders prefer a neutral pH between 6.5 and 7.5, but tolerate acid soils with pH's as low as 5.5. They also resist soil compaction.

SUN/SHADE Boxelder grows best in full sun and is tolerant of shade, although less so than other Maples.

COMPETITIVENESS Boxelder is an invasive species which is highly competitive, due to its rapid growth, high germination rate and the persistence of its fruits. It pioneers old fields, and follows the establishment of Willow and Cottonwood along stream sides.

WILDLIFE VALUE Boxelder is very valuable to wildlife. Its seeds are eaten by squirrels, mice and many species of birds including evening grosbeak and purple finch. Whitetail deer and smaller animals browse the leaves and twigs.

WOOD CHARACTERISTICS The light-colored wood of Boxelder tree is weak, and not in wide commercial use.

PRODUCTS Boxelder is used for paper pulp and firewood and made into crates and pallets. The tree, like all Maples, is used for syrup production, although its use has been limited.

ADDITIONAL COMMENTS *Acer negundo* is frequently used in windbreaks and shelter belts.

RED MAPLE

(ACER RUBRUM)

HEIGHT/SPREAD/DBH Red Maple grows to 60 -90' (18-27 m) in height, with a spread of 50 - 75' (15 - 22.5 m). The spread of the tree is roughly 3/4 of its height. At full size, the tree has a diameter (DBH) of 18 - 30" (46 - 76 cm)

FORM Red Maple has a pyramidal form as a young tree, but later develops ascending branches that give the mature tree a rounded outline. Trees grown on poor sites tend to have irregular forms and internal structural defects.

FOLIAGE The leaves of the Red Maple are dark green with gray undersides. They emerge in mid to late April and drop in late September. Red Maples are prized for their fall colors which range from bright yellow to orange and red. In Winter, Red Maples are identified by their bright red twigs.

FLOWER Red Maple is one of the earliest trees to flower, producing inconspicuous flowers between March and May, several weeks before their leaves emerge. Red Maples are polygamo-dioecious, with a tendency toward dioeciousness.

FRUIT The fruits of the tree are paired samara that ripens between April and June. They are dispersed over a two week period by the wind and have a very high germination rate. Red Maples produce seeds as early as age 4.

RANGES Within the Great Plains, Red Maple's native range is limited to the eastern portions of Oklahoma and Texas. The tree, which is native to most of the eastern United States, is planted as far north as USDA Zone 3a.

MOISTURE REQUIREMENTS Red Maple grows in moisture conditions ranging from dry and well drained to very wet soils.

GROWTH RATE/LIFESPAN Red Maple experiences rapid growth as a young tree, and can grow 18 - 25' (5.5 - 7.5 m) over ten years. The lifespan of the tree usually doesn't exceed 150 years.

DISEASES/INSECTS The tree is subject to serious attack by many types of trunk rot fungi and stem diseases. It is also susceptible to numerous leaf diseases, although they do not cause major damage. Many types of insects feed on Red Maple, but they do not cause serious damage to healthy trees. They may reduce the trees' vigor, however, leaving them more susceptible to fungi.

OTHER DAMAGING AGENTS Red Maple is very sensitive to mechanical injury. Wounds may cause large areas of the surrounding cambium to die back. The tree is highly susceptible to fire injury at all stages of growth, but resprouts shortly thereafter.

ROOT SYSTEM The tree has a highly adaptable root system. On dry sites, it develops a taproot with short laterals. On wetter sites, the tap root turns horizontally to produce a system of fibrous lateral roots which can grow over 80' (25 m) in length. The majority of these fibrous roots are located within 3" (8 cm) of the surface. The root systems of Red Maples retain their adaptability as they grow older. Adventitious roots develop along the stem during extended flooding, and drought conditions may cause the root system to stop growing for several weeks, until renewed soil moisture creates a new flush of growth.

HABITAT Red Maple is capable of growing in lowland or upland areas, but its best growth occurs in moist lowland soils. The tree has been observed at elevations to 3,000' (900 m) in the eastern United States.

SOIL REQUIREMENTS Red Maples grow well under a wider range of soil conditions than any forest species in the United States. They thrive in soils ranging in texture from coarse sands to very fine clay. They prefer an acid pH between 4.5 and 6.5., and are found in soils belonging to the orders of Entisols, Inceptisols, Ultisols, Alfisols, Spodosols and Histosols.

SUN/SHADE The trees are considered to be shade tolerant, although seedlings are generally more tolerant than older trees.

COMPETITIVENESS Red Maple is either a pioneer or a subclimax species. Seedlings respond quickly to release and fill spaces in the forest canopy. They greatly increase their numbers following disturbance and grow rapidly, although competition within the stand later slows their growth. Red Maple is very resistant to herbicide damage and control.

WILDLIFE VALUE The tree is very valuable to wildlife. The chief consumers of the fruit are rodents and songbirds. The leaves and twigs are browsed by elk, white-tailed deer and rabbits. Trees that are harvested for browse, should be cut after the leaves fall, because stems are more palatable to wildlife.

WOOD CHARACTERISTICS The wood of the Red Maple is light in color and fairly hard and heavy.

PRODUCTS The wood is used for furniture quality uses such as paneling and veneer, and construction quality uses such as boxes, crates, pallets and pulpwood. Red Maple is also a source of high quality firewood. The sap of the tree is used to make syrup, although the season is shorter than Sugar Maple's, because its buds break earlier in the Spring.

ADDITIONAL COMMENTS Red Maples are resistant to soil compaction.

SILVER MAPLE

(ACER SACCHARINUM)

HEIGHT/SPREAD/DBH Silver Maple grows to a full height of 75 - 100' (22.5 - 30 m) with a spread equal to or greater than the height. The diameter (DBH) of a mature Silver Maple is 3' (.9 m).

FORM Silver Maples have a short, coarsely textured bole. Their large branches ascend, forming an irregularly shaped oval.

FOLIAGE Silver Maple gets its name from the silvery, gray underside of its leaves. The tree is the last of the Maples to lose its leaves in late October. The tree has a pale yellow to yellow green autumn color.

FLOWER Silver Maple is the first Maple in bloom, an event which occurs between February and May, long before its foliage emerges. Silver Maples are either monoecious or dioecious. The female flowers are bright red, the males yellowish to silvery.

FRUIT The fruits mature within three weeks of pollination and are spread by the wind between April and June. They have no dormancy, but lose their viability quickly.

RANGE The tree is native to the eastern portions of the Great Plains, from southeastern South Dakota to southeastern Oklahoma. Its USDA planting range extends from Zone 3b to 9.

MOISTURE REQUIREMENTS Silver Maple grows best in wet soils, and withstands prolonged inundation. It also grows in dry soils and is highly resistant to drought.

GROWTH RATE/LIFESPAN *Acer saccharinum* is the fastest growing North American Maple. Seedlings grow from 12 - 36" (30 - 90 cm) their first year, and 25 - 35' (7.5 - 10.5 m) in ten years. Silver Maple reaches maturity at ages 50 and 75 and usually does not live beyond 130.

DISEASES/INSECTS Like other members of the *Acer* genus, Silver Maple is subject to attack by many leaf, stem and woody tissue diseases. The effects of these diseases range from superficial damage to mortality. Although it is attacked by similarly large numbers of insect species, few cause extensive damage.

OTHER DAMAGING AGENTS Because of the tree's accelerated growth, its wood is quite weak and the branches of the tree are especially vulnerable to ice and snow. The tree is also prone to heavy fire damage.

ROOT SYSTEM The tree has a shallow system of far-reaching fibrous roots.

HABITAT Silver Maple is commonly found along streams and in floodplain where it attains its best growth. The tree also grows well in the deep moist soils of upland riparian areas. Silver Maple grows to elevations of 2,000' (610 m).

SOIL REQUIREMENTS *Acer saccharinum* grows well over a wide variety of soils whose textures range from moderately coarse loams to fine silty clay. The tree is primarily found in alluvial soils of the Inceptisol and Mollisol orders. It prefers acid soils with pH readings between 5.5 and 6.5, but sometimes grows in Peats and mucks of the Histosol order which have pH's as low as 2.2 - 3.3.

SUN/SHADE The shade tolerance of the tree depends on site quality. On good sites, Silver Maple is considered shade tolerant, but on poor sites, they are rated between intolerant and very intolerant.

COMPETITIVENESS Silver Maple is highly intolerant of competing vegetation, which significantly reduces their growth, especially on poor upland sites.

WILDLIFE VALUE The tree is a very valuable wildlife resource. The seeds are an important food source for gray, red and fox squirrels and birds like pine and evening grosbeaks. The leaves and branches are browsed by whitetail deer and beavers, and the tree provides cavity and nesting sites for squirrels, raccoons and ducks.

WOOD CHARACTERISTICS The wood is white to light brown in color and is sold, together with Red Maple, as soft maple lumber. The wood is fairly hard and heavy, but brittle, and it is inferior in quality to Sugar Maple (*Acer saccharum*).

PRODUCTS The wood is primarily used for construction quality uses such as furniture framing, crates, poles, firewood and pulp. It is also used for paneling and veneers. The species has potential for use in syrup production although it has a short season, like Red Maple, because its buds break early in the Spring. Syrup produced from Silver Maples has a lower sugar concentration than other Maples species.

ADDITIONAL COMMENTS The tree is used in windbreaks and is considered an ornamental species.

SUGAR MAPLE

(ACER SACCHARUM)

HEIGHT/SPREAD/DBH Sugar Maple has a full, mature height of 90 - 120' (27 - 37 m), and its spread is approximately 2/3 of the height. The full size tree's diameter (DBH) is 30 - 36" (76 - 91 cm). It is more common, however, to find full-sized trees between 70 and 100' tall (21 - 30 m) with diameters (DBH's) of 24 - 36" (60 - 90 cm).

FORM The tree has a dense, crowded form, with an oval to a rounded outline.

FOLIAGE In Autumn, the leaves' dark green color changes into many variations of bright yellow, burnt orange and fiery red. The palmately lobed leaves emerge in early May and fall in October. The tree returns high concentrations of nutrients to the soil, because of the large quantities of leaf litter it produces.

FLOWER The tree produces flowers between late March and mid May. The flower is perfect, but only one sex is functional in each flower. Flowering begins at age 22 at the earliest.

FRUIT The fruit is a double samara that usually produces only one seed per pair. It matures in four months and the samara falls just before the leaves drop. The seed requires cold temperatures for germination, with an optimum temperature of 34° F (1° C), which is the lowest germination temperature of any forest species. The seeds have an average germination rate of 95%, and trees in northern climates produce many seedlings.

RANGE In the Great Plains, Sugar Maple is native to the eastern fringe of Kansas. The tree is planted in USDA zones 3a - 8

MOISTURE REQUIREMENTS Sugar Maple requires moist soils. It doesn't grow in dry soils and is highly intolerant of flooding, especially during the growing season.

GROWTH RATE/LIFESPAN Sugar Maple seedlings grow slowly, but the tree eventually achieves a medium rate of growth. They reach their full height by the age of 150 and live 300 - 400 years.

DISEASES/INSECTS The tree is subject to many diseases which reduce their commercial and ornamental value, but rarely kill them. The most serious type of insect damage is caused by bud miners which kill the terminal bud, and cause repeated forking, which reduces the length of marketable logs.

OTHER DAMAGING AGENTS Sugar Maples in the over story of the forest canopy are extremely sensitive to airborne industrial pollutants. Seedlings, and smaller trees in the under story, are more protected and less likely to be damaged or killed. In even-aged stands, young trees of 1 - 3" (2.5 - 7.6 cm) in diameter (DBH) are frequently damaged by winter sunscald.

ROOT SYSTEM The plant's root structure is comprised of oblique laterals. Roots which grow from the topside of the lateral root extend into the humus layer of the soil. Roots which develop along the underside of the lateral grow downward through the soil. Because of its root system, the tree is very resistant to windthrow. The roots release an exudate which reduces the growth of competing Yellow Birch (*Betula alleghaniensis*) when the growth cycles of their root systems concur.

HABITAT Sugar Maples are generally used in upland soils, because of their intolerance to flooding, but they also grow in non-flooded lowland areas into which cold air drains. The trees grow to 2,500' (762 m) in northern elevations.

1st, 4th, 1st

SOIL REQUIREMENTS The tree grows best in coarse to medium textured soils comprised of sandy to silty loams. *Acer saccharum* prefers acid to neutral soil ranging in pH from 5.5 to 7.3. It will also grow in strongly acid soils with pH levels as low as 3.7. Sugar Maple is sensitive to compaction of the soil and is commonly found in soils of the Spodosol, Alfisol and Mollisol orders.

SUN/SHADE Sugar Maple trees are the most shade tolerant Maple species, and they achieve their peak photosynthetic efficiency at 25% of full sunlight. The trees survive long periods of suppression, which they eventually overcome if the dominant trees are scattered.

COMPETITIVENESS Sugar Maples may experience reduced growth and have lower rates of survival if they are competing with Striped Maple (*Acer pennsylvanicum*), Black Cherry (*Prunus serotina*), Yellow Poplar (*Liriodendron tulipifera*) or any of the Oak species (*Quercus* species). Competing trees should be released gradually to prevent epicormic sprouting of dormant buds in Sugar Maple.

WILDLIFE VALUE *Acer saccharum* is a very valuable wildlife resource. Porcupines browse the bark, and the leaves and twigs are a favorite source of browse for deer. Red, gray and flying squirrels eat the seeds, buds, foliage and twigs of the tree and, like a porcupine, may girdle the stem.

WOOD CHARACTERISTICS The white to light reddish brown wood is heavy, straight grained wood.

PRODUCTS Sugar Maple is the primary source of Maple syrup. Its sap has the highest sugar content of any Maple, and it has one of the longest sap-producing seasons because it breaks buds later in the Spring. The wood, which is marketed as "Hard Maple," is used in furniture and for construction quality uses. Sugar Maple also provides high quality firewood.

ADDITIONAL COMMENTS Sugar Maple is one of the first trees to change color in late Summer. It is often planted as an ornamental species.

YELLOW BUCKEYE

(*AESCULUS OCTANDRA*)

HEIGHT/SPREAD/DBH The Yellow Buckeye is the tallest Buckeye species. It grows to a full height of 70 - 90' (21 - 27 m), with a spread approximately equal to one half its height. Mature trees have a diameter (DBH) of 2 - 3' (0.6 - 0.9 m).

FORM The tree has an irregular to oval form.

FOLIAGE *Aesculus octandra* is one of the first trees to leaf out in Spring. The leaves are palmately compound with five, and occasionally seven, leaflets. In Autumn, the dark green leaflets turn orange or red before falling in late September.

FLOWER The tree produces showy inflorescences of yellow to yellow-white flowers between April and June, after the leaves have emerged. The perfect flowers at the base of the inflorescence are the only flowers on the tree that are fertile. The staminate flowers higher up on the inflorescence are infertile.

FRUIT The fruit, which ripens in September, is a light green, three-part capsule that contains as many as four shiny, chocolate-colored seeds called buckeyes. Buckeyes contain a glucoside, aesculin, which is poisonous to humans, animals and possibly fish.

RANGE *Aesculus octandra* is not native to the Great Plains region. It is planted in USDA zones 3 - 8.

MOISTURE REQUIREMENTS The tree requires moist to wet soil and has intermediate tolerance to flooding. It also grows in dry soils, but is sensitive to drought.

GROWTH RATE/LIFESPAN Yellow Buckeye seedlings grow quickly, but the tree's growth rate slows later. The tree reaches maturity within 60 - 80 years and lives to 250 years.

DISEASES/INSECTS Yellow Buckeye trees are favored over Ohio Buckeyes (*Aesculus glabra*) because they have significantly less disease and insect problems. The tree has few insect enemies except for the Buckeye Lacebug which defoliates it. Yellow Buckeye is subject to several leaf diseases, such as leaf blotch and leaf spot, but has few disease problems overall.

ROOT SYSTEM Yellow Buckeye seedlings quickly develop a large taproot system which makes them fairly difficult to transplant.

HABITAT The tree grows as a bottomland species in the northern portion of its range. In southern areas, it is found along upland slopes. Yellow Buckeye grows between 500' and 6300' (152 - 1920 m) in elevation.

SOIL REQUIREMENTS Yellow Buckeye grows best in coarse to medium textured loams that are part of the Alfisol and Entisol orders. It requires slightly acid to neutral soil between 6.1 and 7.0 pH.

SUN/SHADE *Aesculus octandra* is a shade tolerant species, which grows well in understory areas.

COMPETITIVENESS Yellow Buckeye is not a pioneer species. It can only establish itself on the best sites, because the buckeyes dry out quickly and there are few means of seed dispersal. Once established, the trees grow well in competition with other species.

WILDLIFE VALUE Buckeyes are not eaten by wildlife. The trees should not be used near grazing areas because buckeyes and young shoots, which are also poisonous, are attractive to cattle.

WOOD CHARACTERISTICS The wood is softer than any other American hardwood. The sapwood is white to gray in color, and the heartwood is creamy white.

PRODUCTS Although Yellow Buckeye lumber is considered poor quality wood, it is used to make crates, boxes, woodenware, furniture framing, trunks and drawing boards.

ADDITIONAL COMMENTS Yellow Buckeye is the most ornamental Buckeye species because of its form and Autumn color. Indians made a nutritious flour from buckeyes, by removing their glucosides in a slow process involving roasting, mashing and leaching the fruits over several days.

RIVER BIRCH

(*BETULA NIGRA*)

HEIGHT/SPREAD/DBH River Birch grows to 40 - 80' (12 - 24 m) at full height and has a spread of 35 - 50' (10 - 15 m). A fully grown specimen has a diameter (DBH) of 1 - 2' (0.3 - 0.6 m).

FORM River Birch often lean slightly or they may be forked at the base. Young trees tend to have a columnar form, while older trees develop an irregular to a globular crown.

FOLIAGE The leaves of the tree emerge in early May and fall quickly in late October. The medium to dark green foliage, turns pale yellow in Autumn.

FLOWER River Birch are monoecious. They form catkins in the Fall, that bloom the following Spring from April through May. The tree releases large amounts of pollen, and is a major contributor to hayfever allergies.

FRUIT *Betula nigra* is the only Birch species which does not produce seed in the Fall. Its seed is a small cylindrical nutlet that matures between June and early August. The trees produce a large crop most years.

RANGE Within the Great Plains, River Birch is native to the eastern portions of Oklahoma and Texas. The tree is planted in USDA zones 4-9.

MOISTURE REQUIREMENTS Although flooding may damage or kill seedlings, mature trees tolerate flooding and grow in soils that hold large amounts of moisture over long periods. River Birches also resist drought and hot, dry conditions.

GROWTH RATE/LIFESPAN River Birch is a fast growing tree, which grows 30 - 40' (9 - 12 m) in a 20 years period. The tree reaches maturity between the ages of 50 and 75 and lives to 125 years.

DISEASES/INSECTS The tree is highly resistant to the Bronze Birch Borer and has few serious diseases or insect problems. Anthracnose Leaf Blight is its most common leaf disease and Christmas Mistletoe occurs on trees growing on low wet sites in the southern United States.

OTHER DAMAGING AGENTS Ice floes can damage or destroy young stands of River Birch along riverbanks. The tree's wood is weak and damage from high winds occurs frequently.

ROOT SYSTEM The tree has a shallow root system consisting of fibrous, spreading roots which make it an excellent choice for streambank erosion control.

HABITAT River Birch is found in lowland floodplains and along streams. The tree also grows on upland soils and is the most successful Birch under hot, dry conditions.

SOIL REQUIREMENTS *Betula nigra* grows in Entisol soils. It resists compaction and adapts to any soil texture. The tree prefers acid soils with a pH of 6.5 or less.

SUN/SHADE River Birch is classified as shade intolerant.

COMPETITIVENESS The tree is a pioneer species which does well in competition with other bottomland species.

WILDLIFE VALUE The species is very valuable to wildlife. Whitetail deer eat the twigs and buds, while rodents, along with birds such as ruffed grouse and wild turkey, eat the seed.

WOOD CHARACTERISTICS The sapwood is whitish to light brown, and the heartwood is light to dark brown. The wood is hard, straight grained and lighter than other Birch species.

PRODUCTS River Birch wood is not used as extensively as other Birch species because of its lighter weight. It is made into furniture, tool handles, artificial limbs and toys. It is also mixed with other woods to make pulpwood.

ADDITIONAL COMMENTS The tree is planted as an ornamental specimen for its Fall color and exfoliating bark which provides winter interest.

WATER BIRCH

(*BETULA OCCIDENTALIS*)

HEIGHT/SPREAD/DBH Water Birch grows to a full height of 25 - 40' (7.6 - 12.0 m) with a diameter (DBH) of 6 - 12" (15 - 30 cm).

FORM *Betula occidentalis* is a small, shrubby tree that develops into thickets. It has a rounded crown with drooping branches.

FOLIAGE The glossy topside of the foliage is dark greenish-yellow, and its underside is pale yellow.

FLOWER The tree is monoecious, flowering in early Spring. The male flowers are drooping yellow catkins, while the female flowers are short greenish catkins which stand upright.

FRUIT The fruit is a hanging cone that matures by late Summer and contains numerous two-winged nutlets. Water Birch produces seed by the age of 12.

RANGE Water Birch is native to southern Saskatchewan and parts of southwest Manitoba. In the American Great Plains, the tree is scattered in large pockets across the Dakotas, Montana and Wyoming.

MOISTURE REQUIREMENTS Moist stream side area is where the tree is usually found, but it also grows in dry soils.

GROWTH RATE/LIFESPAN

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT The tree is mostly found on lowland sites, but also grows in upland areas. Water Birch grows from 2,000 - 8,000' (610 - 2438 m) in elevation.

SOIL REQUIREMENTS

SUN/SHADE

COMPETITIVENESS Water Birches compete successfully with other stream side species, including Willows, Alders and Poplars.

WILDLIFE VALUE The foliage is browsed by sheep and goats.

WOOD CHARACTERISTICS The tree doesn't grow large enough for its wood to be used commercially.

PRODUCTS The wood is used locally for fence posts and firewood.

ADDITIONAL COMMENTS Water Birch hybridizes with Paper Birch (*Betula papyrifera*), producing a tree that has characteristics of both plants.

PAPER BIRCH

(BETULA PAPYRIFERA)

HEIGHT/SPREAD/DBH Paper Birch grows to a full height of 50 - 75' (15 - 22.5 m) with a spread of 35 - 50' (10 - 15 m), or 1/2 - 2/3 of the height. The mature tree has a diameter (DBH) of 1 - 2' (0.3 - 0.6 m).

FORM The tree can have multiple stems or a single trunk, and develop an irregularly shaped crown.

FOLIAGE *Betula papyrifera* has thin leaves which emerge in late April. The leaves are dull green in Summer and turn an attractive dusky yellow in Autumn. They fall in mid October.

FLOWER Paper Birch is a monoecious species which produces catkins each Summer. The flowers reach maturity the following Spring between mid April and early June. The drooping brown catkins are staminate, and the shorter upright green catkins are pistillate.

FRUIT The fruit, which ripens between early August and mid September, is a 1.5 - 2.0" (3.75 - 5.0 cm) catkin with many scales. Each scale encloses a small winged nutlet. The tree begins to produce fruit by age 15, and reaches optimum fruit production between the ages of 40 and 70.

RANGE Within the American Great Plains, the tree is native to a few scattered sites in Montana and the Dakotas, including the Black Hills. In the Canadian Great Plains, Paper Birch is native to central and northern Saskatchewan and all of Manitoba, except in the northeast and along the southern fringe of the Province. The tree is planted in USDA zones 2 - 6.

MOISTURE REQUIREMENTS The tree grows in poorly drained or moist soils, but does not tolerate flooding and it does not develop adventitious roots during inundation. Paper Birch is most likely to be found in drier soils because it has a degree of drought resistance.

GROWTH RATE/LIFESPAN Individual specimens exhibit dominance at an early age. They grow rapidly, reaching a diameter (DBH) of 8" (20 cm) within 30 years. Suppressed trees either die quickly or linger many years. Dominant individuals reach maturity within 60 - 70 years, and rarely live beyond 140 years.

DISEASES/INSECTS Paper Birch is subjected to frequent attack by diseases and insects. Its most serious threat is the Bronze Birch Borer which attacks older or weakened trees. The pest also attacks trees weakened by a condition known as "Postlogging decadence" that affects older stands after heavy cutting. They are damaged by fungi that attack the roots, stems and bole of the plant and by numerous defoliators.

OTHER DAMAGING AGENTS Fire is the most serious threat to Paper Birch, due to its thin and flammable bark. The trees are very susceptible to mechanical damage during logging. Mechanical wounds, which occur mostly to the roots and along the bole, allow disease microorganisms to enter the tree. Industrial pollutants that contain heavy metals repeatedly kill young top growth. Later, the trees' resprout, resulting in coppiced woodlands.

ROOT SYSTEM The tree has a shallow system of roots which are mostly in the top 24" (60 cm) of the soil. Despite its shallow lateral roots, Paper Birches tend to snap off during high winds rather than tear from the soil. The root system is frequently attacked by root-rot fungi that cause cracks (or "collar cracks") to appear at the base of the trunk. Trees suffering from this condition are more likely to be uprooted.

HABITAT Paper Birch is an upland species which occurs in dry, mesic soils. The tree grows to 4,000' (1219 m) in elevation.

SOIL REQUIREMENTS *Betula papyrifera* grows in a wide variety of soil textures, ranging from coarsely stony loams to moderately fine sandy loams. The tree's pH requirements fall between 5.0 and 8.0, and it tolerates highly calcareous soils. Paper Birches are native to soils of the Histosol, Spodosol, Inceptisol and Entisol orders.

SUN/SHADE Paper Birch does not tolerate shade, and its seedlings require the release of nearby, faster growing species. Their response is proportionate to the degree of release that occurs. Mature stands of Paper Birch do not respond to release, however.

COMPETITIVENESS The tree is nutrient sensitive. Studies in which nitrogen, phosphorous and lime are added to the soil, show increased growth in stems, bark, branches and foliage. The foliage may smother spruce seedlings growing in close proximity.

WILDLIFE VALUE The tree is very valuable to wildlife, however, steps may be required to protect it. Young Paper Birches are an important source of browse for deer and moose which often damage them by overbrowsing. Animals such as porcupines, red squirrels and rabbits feed on the shoots and inner bark and girdle stems and lower branches. The seeds are eaten by many birds including the ruffed grouse which also eats buds and catkins.

WOOD CHARACTERISTICS The wood is whitish to pale brown. Paper Birch lumber, which is moderately hard and heavy, is lower in quality than Yellow Birch (*Betula alleghaniensis*) and Black Birch (*Betula lenta*).

PRODUCTS Paper Birch is primarily used for pulp and biomass and is also a source of high quality firewood. The trees are tapped in the Spring to obtain a sap that can be boiled down to make beer, wine, syrup or medicinal tonics. Paper Birch's sap producing season lasts longer than any Maple species. Paper Birch syrup is more acidic than Maple syrup and it has a lower sugar content.

ADDITIONAL COMMENTS The tree is often used as an ornamental species.

AMERICAN HORNBEAM

(*CARPINUS CAROLINANA*)

HEIGHT/SPREAD/DBH American Hornbeam has a mature height of 15 - 35' (5 - 11 m) with a roughly equal spread. A fully grown tree has a diameter (DBH) of up to 1' (0.3 m).

FORM The tree is grown as a large multistemmed shrub or a small tree with a single bole. The branches of American Hornbeam are spread out laterally, creating a wide crown.

FOLIAGE The leaves that emerge in late March are reddish green and mature to a dull, dark blue green over Summer. In Fall, the leaf colors vary between shades of red, orange and yellow, before dropping in early October. American Hornbeam leaves contain low concentrations of nitrogen, phosphorous, potassium and calcium compared with other species. However, the concentration of these elements in the plant's leaf litter is higher than other tree species, meaning that American Hornbeam returns a high percentage of nutrients to the soil.

FLOWER The plant is monoecious, producing green or brown catkins with reddish scales that bloom as the leaves emerge. The flowers are pollinated by the wind over a long period between late March and the end of May.

FRUIT The tree produces clusters of ribbed nutlets that reach maturity between mid June and late October and are dispersed by wind or the birds. *Carpinus caroliniana* produces a good crop every three to five years.

RANGE American Hornbeam is an eastern species native to southeast Oklahoma and eastern Texas. It is planted from USDA zones 2 - 9.

MOISTURE REQUIREMENTS The tree accepts a wide range of moisture conditions, ranging from wet lowland soils that are inundated up to 25% of the time, to excessively drained upland soils. Despite its tolerance of low moisture conditions, the tree is sensitive to the combined effects of heat and drought.

GROWTH RATE/LIFESPAN *Carpinus caroliniana* is a fairly slow growing species. Up to 8" (20 cm) of growth per year occurs on the best sites. The trees reach maturity around the age of 150 years.

DISEASES/INSECTS American Hornbeams experience few diseases or insect problems.

OTHER DAMAGING AGENTS The tree is susceptible to fire damage.

ROOT SYSTEM The root system is made up thick lateral roots which extend deep in the soil. It is difficult to transplant the tree because of its deep root system.

HABITAT The tree is best suited to wet-mesic ecotones in lowland areas, and also grows well in upland mesic soils. *Carpinus caroliniana* grows on very wet sites provided there is sufficient drainage to impede saturation and maintain aeration. The tree grows to 3,000' (914 m) in elevation.

SOIL REQUIREMENTS The tree, which is sensitive to soil compaction, requires medium textured loam to fine, silty loam. The soil should be acidic with a pH ranging from 4.0 - 5.6, although the tree will grow in soil with pH levels as high as 7.1. The tree is found in soils belonging to the Alfisol, Ultisol, Inceptisol, Entisol, Spodosol, Histosol and Mollisol orders.

SUN/SHADE Overall, American Hornbeams are extremely shade tolerant, but their tolerance declines with age. The trees have to be released to reach maturity, or an opening must exist in the canopy.

COMPETITIVENESS The tree is an aggressive competitor which is considered a weed on southern and commercial timber production sites. The seeds germinate in deep shade on leaf litter beds and American Hornbeam seedlings prevent overstory trees from occupying open ground.

WILDLIFE VALUE The seed is an important food source for gray squirrels, and the leaves and twigs are a primary food source for beavers. Overall, though, the tree has limited wildlife value. The tree is a secondary source of browse for white-tailed deer, and the seeds, buds and catkins are eaten by ruffed grouse, ring-necked pheasants, bobwhite and turkey, as well as numerous songbird species and foxes.

WOOD CHARACTERISTICS The heavy wood is whitish to brownish white and has a close grain. It resists splitting and cracking and is very hard and durable.

PRODUCTS American Hornbeam lumber is well suited for commercial production, however, the small size of the tree limits its use. The wood is used on a local basis for products such as tool handles, levers, wedges and high quality firewood.

ADDITIONAL COMMENTS The tree is considered an ornamental species for its attractive Fall color.

BITTERNUT HICKORY

(*CARYA CORDIFORMIS*)

HEIGHT/SPREAD/DBH Bitternut Hickorys are tall, broad trees which grow 60 - 80' tall (18 - 24 m) with spreads which equal their height. The diameter (DBH) of a fully grown Bitternut Hickory is 1 - 2' (0.3 - 0.6 m).

FORM The tree has a wide, rounded form with a tall bole and ascending branches.

FOLIAGE Light green, pinnately compound leaves emerge in mid-May and mature to a dark yellow-green over Summer. In the Fall, they turn golden yellow before dropping in mid October.

FLOWER The tree is monoecious and produces single or paired female flowers and clusters of long male catkins that produce large amounts of pollen. These flowers bloom from April to May.

FRUIT The tree is named for its bitter-tasting fruits which reach maturity during September and October and are dispersed through December. Large scale fruit production begins by the age of 30, with large crops at three - five year intervals.

RANGE The tree is native to southeastern Nebraska and eastern Kansas, Oklahoma and Texas. The tree is planted in USDA zones 4a - 9.

MOISTURE REQUIREMENTS Bitternut Hickory grows across a wide range of moisture conditions, ranging from wet to dry soils with intermediate tolerance to flooding and drought.

GROWTH RATE/LIFESPAN The tree has the shortest lifespan of any Hickory, with a maximum life expectancy of 200 years. Bitternut Hickory has a slow to a medium rate of growth, reaching 30' (9 m) in 40 years.

DISEASES/INSECTS All areas of the plant are attacked by a number of diseases and insects, none of which cause serious damage. The most common diseases are White Heart Rot and foliage diseases which afflict all Hickories. The nuts are attacked by the Hickory Nut Weevil which typically destroys up to 65% of the crop.

OTHER DAMAGING AGENTS Bitternut Hickory saplings are extremely susceptible to fire damage. Older specimens are also susceptible, because their hard bark does not insulate them from fire.

ROOT SYSTEM The root system undergoes extensive changes throughout the tree's development. Young trees develop a deep taproot with an extensive lateral network. By age 10, the lateral roots' spread is twice that of the crown. A mature Bitternut Hickory does not have any major lateral roots, however. Instead, it has a deep taproot with smaller laterals. During the growing season, root growth starts and stops in a cyclic response to environmental conditions. Four to eight such cycles occur over a typical season. Bitternut Hickory's sprout prolifically from their roots, stumps and root collars. Resprouting occurs frequently with successive shoots growing taller, and having stronger root systems, than their predecessors.

HABITAT Bitternut Hickory grows on lowland or upland soils, from flood plains to dry slopes. The tree grows to 2,000' (610 m) in elevation.

SOIL REQUIREMENTS The tree grows in soils ranging in texture from coarse loamy sands to moderately fine, sandy clay. It has intermediate tolerance to soil compaction and is found in soils belonging to the Ultisol, Inceptisol, Mollisol and Alfisol orders. The tree's pH requirements range from moderately acid (5.6) to moderately alkaline (8.0).

SUN/SHADE The species is classified as intolerant of shade, but some genotypes may have intermediate shade tolerance.

COMPETITIVENESS Although Bitternut Hickory seedlings are more shade tolerant than associated species, they are difficult to establish from seed due to predators like the Hickory Nut Weevil. The tree is more likely to spread by sprouting, especially on dry sites which restrict drought sensitive species. Bitternut Hickory is less sensitive to frost damage than other Hickorys.

WILDLIFE VALUE Bitternut Hickory's value to wildlife is low to moderate. The seeds are bitter tasting, due to their high tannin content, and are not eaten by wildlife, unless other, sweeter, Hickory nuts are not available. Cottontail rabbits, beavers, other small animals and rodents feed on the bark.

WOOD CHARACTERISTICS The wood is whitish or pale to reddish brown. It is close grained and very heavy. The wood is quite hard, but brittle, with a high degree of shock resistance.

PRODUCTS Bitternut Hickory is used to make handles for tools like hammers, axes and sledgehammers which require a hard and resilient wood. The wood is also used for furniture, paneling, dowels, ladders, crates, pallets and flooring. Bitternut Hickory is an excellent source of firewood.

ADDITIONAL COMMENTS The tree is often planted as a shade and ornamental species. Bitternut Hickory is a good choice for riparian plantings because it improves the soil by recycling high concentrations of essential elements via leaf litter, and the extensive root systems of young specimens' holds the soil together.

PECAN

(*CARYA ILLINOENSIS*)

HEIGHT/SPREAD/DBH Pecan is the tallest North American Hickory. Most large Pecans are 70 - 100' tall (21 - 30 m), but fully mature specimens can grow as large as 180 - 200' (54 - 60 m). The tree's spread is roughly equivalent to 3/4 of its height, and fully grown trees have a DBH of 70 - 83" (180 - 210 cm.)

FORM The tree has a tall trunk with a broad, open crown of large branches.

FOLIAGE Sickle-shaped leaflets emerge in early May. They mature to a dark green over Summer and are golden yellow brown in Fall.

FLOWER The tree is monoecious, blooming near the time of leaf emergence. It produces pendulous clusters of staminate catkins and much smaller arrangements of pistillate flowers on blunt terminal spikes.

FRUIT The fruits are pear-shaped nuts that ripen during September and October and are dispersed through December by water and animals. They are enclosed in a husk which turns black as the fruit ripens. Some cultivars may produce fruit as early as age two, but trees in native stands usually do not produce until the age of 20.

RANGE The tree is native to portions of southeastern Kansas, much of central and eastern Oklahoma and the eastern half of Texas, excluding the Gulf Coast region. Pecans grow in USDA zones 5 - 9.

MOISTURE REQUIREMENTS Pecans require poorly to moderately-well drained soil. The tree has intermediate tolerance to flooding and withstands short periods of inundation. It also has intermediate resistance to drought.

GROWTH RATE/LIFESPAN Pecans are the fastest-growing Hickory. Seedlings grow up to 35" (90 cm) per year and the tree has a slow to a medium rate of growth over the course of its life. Pecans often live more than 300 years.

DISEASES/INSECTS Pecans are subject to attack by many types of disease and insects. The most prominent diseases are wood and root rots caused by fungi. Insects attack all parts of the tree girdling branches, greatly reducing the crop and killing trees. During periods of drought, insect-related mortality increases greatly.

OTHER DAMAGING AGENTS Pecans of all ages are fire-sensitive.

ROOT SYSTEM Pecans have a long taproot that makes transplanting difficult.

HABITAT The trees are commonly found in moist lowland areas to 1,600' (488 m) elevation.

SOIL REQUIREMENTS Pecans grow in moderately coarse to moderately fine soils of the Entisol, Inceptisol and Alfisol orders. They grow best in sandy loams to silty clays with pH's ranging from 6.5 to 7.5. Pecan trees have intermediate tolerance to soil compaction.

SUN/SHADE Pecans do not tolerate shade, and is the least tolerant Hickory overall.

COMPETITIVENESS *Carya illinoensis* responds well to release at any age, provided it is in good health.

WILDLIFE VALUE The tree's value to wildlife is categorized as "intermediate." Pecans are eaten by more than 10 bird species, along with foxes, deer, gray squirrels, opossums, raccoons and peccaries.

WOOD CHARACTERISTICS The wood is whitish to light reddish brown. It has a straight grain and is hard and heavy.

PRODUCTS The wood is used for tool handles for its high degree of shock resistance. Pecan is an attractive wood used in flooring, cabinets and veneer. The tree is also an excellent source of firewood. Pecans are highly nutritious and a valuable source of income. Mature trees produce a good crop every one to three years, with total production of 500 - 1,000 pounds (225 - 450 kilograms).

HACKBERRY / SUGARBERRY

(*CELTIS OCCIDENTALIS & C. LAEVIGATA*)

HEIGHT/SPREAD/DBH Hackberry grows from 30 - 50' (9 - 15 m), while Sugarberry grows to 80' (24 m). Both species' spreads are roughly equal to their heights. A mature Sugarberry has a diameter (DBH) of 1.5' (0.5 m) while Hackberrys' larger diameter (DBH) is 1.5 - 3' (0.5 - 0.9 m).

FORM Mature specimens of both trees have a vase-like form of ascending branches.

FOLIAGE Hackberry leaves emerge in late April. Both species' leaves are dark green in Summer and pale lemon yellow in the Fall. Hackberries lose their leaves in early November.

FLOWER Both trees are polygamo-monecious and produce small green flowers. Sugarberry blooms between mid-March and May, while Hackberries bloom between early April and early May.

FRUIT Both *Celtis* species produce small drupes that ripen from September - October and persist until midwinter. Ripe fruits are dark red to purple, and they are dispersed by birds, small animals and streams and rivers.

RANGE Hackberry is a northern species, with a native range stretching from central North Dakota to central Oklahoma. It is planted in USDA zones 2 - nine. Sugarberry is a native of the southern Great Plains. Its native range includes eastern and central Texas and Oklahoma. The species is planted in USDA zones 5 - nine.

MOISTURE REQUIREMENTS Both species grow in a variety of moisture conditions and they resist drought. Sugarberrys, like Hackberry seedlings, do not tolerate flooding. Mature Hackberrys, however, withstand periods of inundation lasting up to 25% of the growing season. Soils with permanently high water tables damage Hackberrys, and their use in riparian zones is restricted to upland areas.

GROWTH RATE/LIFESPAN The trees grow at a medium to fast rate. Hackberry typically grows 20 - 30' (6 - 9 m) in a 20 years period. The lifespan of Sugarberry is around 150 years, while Hackberry lives 200 years.

DISEASES/INSECTS The principal disease affecting Hackberry is witches-broom. Eastern mistletoe attacks Sugarberry in the southern Great Plains. Both plants are subject to leaf galls. Butt rot, which is caused by more than 30 fungi species, spreads quickly in Sugarberry.

OTHER DAMAGING AGENTS Both *Celtis* species are very susceptible to fire injury because of their thin bark. Fire wounds create entry points for many damaging agents. Sugarberries are heavily damaged by ice which snaps their trunks and branches.

ROOT SYSTEM Sugarberry trees have a shallow, saucer-shaped root system. Hackberries have deep root systems that sometimes includes a taproot.

HABITAT Both species grow well in lowland and upland soils, although Hackberry's growth is limited on soils with permanently high water tables. In areas of northern and central Oklahoma, where their ranges overlap, Sugarberry is more likely to occur on bottomland sites, while Hackberry grows in upland areas. Sugarberry grows to 2,000' (610 m) in elevation, and Hackberry grows to 5,000' (1524 m).

SOIL REQUIREMENTS Hackberry grows in moderately coarse to moderately fine sandy loams. The tree often grows in limestone soils and outcrops which have a pH range of 6.6 - 8.0. Both trees grow in Entisol and Inceptisol soils, and Hackberry also grows in soils that are part of the Mollisol order.

SUN/SHADE Hackberry has intermediate shade tolerance, and Sugarberry tolerates shade.

COMPETITIVENESS Both species establish themselves in the understory, but long term suppression results in poorly-formed adult trees. Sugarberry responds quickly to release and often outgrows other, more desirable, species. Fallen Sugarberry leaves contain leachate which reduces the germination and growth of many grasses.

WILDLIFE VALUE Hackberry is a highly valuable wildlife species. The fruits, which persist into Winter, are eaten by animals and more than 24 species of birds. Sugarberries are eaten by more than 10 bird species plus game and nongame animals. Bird species that consume the fruits include robins, sapsuckers, mockingbirds, ring-necked pheasants, cedar waxwings and wild turkey.

WOOD CHARACTERISTICS The species' light colored woods are grouped together and sold as Hackberry. They have straight, or interlocked grains and medium weight and hardness.

PRODUCTS The woods are stained an attractive shade of light brown which is difficult to match using other woods. High-grade Hackberry lumber is used in furniture, millwork and sporting goods. Low-grade wood is used to make boxes, posts, crates and furniture core stock. Hackberry wood is a medium quality firewood.

ADDITIONAL COMMENTS

DESERT WILLOW

(CHILOPSIS LINEARIS)

HEIGHT/SPREAD/DBH The plant grows to 25' (7.6 m) with a spread of 10 - 20' (3 - 6 m). Adult trees can have a DBH of 6" (15 cm.)

FORM The plant can be grown as a small tree or large shrub. Tree-form plants have short, leaning trunks and spreading crowns.

FOLIAGE The slightly curved leaves are long, narrow and sometimes hairy or sticky. Desert Willow leaves are light green in color.

FLOWER The flowers appear in fragrant, showy clusters that bloom from mid to late April through August. The funnel-shaped flowers may be pink, white or purple.

FRUIT The fruits are long, cigar-shaped capsules which open in Fall and persist through Winter. The seeds are flat and narrow with papery wings.

RANGE Desert Willow is native to western Texas and southern New Mexico.

MOISTURE REQUIREMENTS The tree is found in poorly drained, stream side areas as well as exceedingly dry, desert washes and grasslands.

GROWTH RATE/LIFESPAN Desert Willow is a rapid growing plant.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT The plant is found in lowland and upland areas. They grow between 1,000 - 5,000' (305 - 1524 m).

SOIL REQUIREMENTS

SUN/SHADE

COMPETITIVENESS Desert Willow shrubs often develop into thickets.

WILDLIFE VALUE Southwestern hummingbirds are attracted to the fragrant, funnel-shaped flowers

WOOD CHARACTERISTICS Desert Willow wood is dark brown. The wood is soft and weak.

PRODUCTS The wood is used locally for firewood and fence posts.

ADDITIONAL COMMENTS Desert Willow is not a true Willow species. They are considered an ornamental plant and are widely used for erosion control.

TURKISH FILBERT

(*CORYLUS COLURNA*)

HEIGHT/SPREAD/DBH Turkish Filbert reaches 40 - 80' (12 - 24 m) tall and its spread ranges from 1/3 - 2/3 of its height.

FORM The tree has a broad pyramidal crown and a short trunk.

FOLIAGE The dark green foliage has a leathery texture. The leaves usually turn yellowish green in Fall.

FLOWER The tree is monoecious, producing clusters of male catkins and inconspicuous female flowers in early Spring.

FRUIT The tree produces small nuts that are partially enclosed by an involucre. They mature from September - October.

RANGE The tree is planted in USDA zones 4 - 7.

MOISTURE REQUIREMENTS Turkish Filberts grow best in moist, well-drained soil. Seedlings planted in upland areas may require watering, but once established, they are highly tolerant of drought conditions.

GROWTH RATE/LIFESPAN The tree has a medium rate of growth.

DISEASES/INSECTS *Corylus colurna* has few diseases or insect problems.

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT The tree grows best in moist lowland soils, but it is highly tolerant of hot, dry conditions.

SOIL REQUIREMENTS Turkish Filberts are pH adaptable. They prefer loamy soil, but are adaptable to a wide variety of soils

SUN/SHADE The tree requires full sun.

COMPETITIVENESS The tree grows well in areas with long cold winters and hot dry summers.

WILDLIFE VALUE The nuts are eaten quickly by squirrels.

WOOD CHARACTERISTICS

PRODUCTS Turkish Filberts produces edible nuts that are marketed as Hazelnuts or Filberts.

ADDITIONAL COMMENTS

COCKSPUR HAWTHORN

(*CRATAEGUS CRUS-GALLI*)

HEIGHT/SPREAD/DBH Fully grown Cockspur Hawthorns are 20 - 30' (6 - 9 m) tall, with spreads roughly equal to their height. The trees' diameters (DBH) are as large as 1' (0.3 m).

FORM The tree has a horizontal branching pattern that gives it a globular form. The branches are covered with spines as long as 3" (7.5 cm).

FOLIAGE The leaves emerge in mid May and mature to a glossy, dark green. In the Fall, their colors are shades of red, orange and purple.

FLOWER The tree blooms for several weeks in May and June. The attractive, white-petaled, flowers have a disagreeable scent, and they are arranged in dense clusters.

FRUIT The fruit is a dull red, apple-like berry, that reaches maturity between August and October. The clustered fruit persists through early Winter.

RANGE The plant's range extends from the southeastern tip of Nebraska to central Texas. Cockspur Hawthorn is planted in USDA zones 3 - 7.

MOISTURE REQUIREMENTS *Crataegus crus-galli* grows in a wide range of moisture conditions. Although the tree grows best in moist soils, it tolerates dry soil and is resistant to drought. The tree also grows in poorly drained soils and has intermediate resistance to flooding.

GROWTH RATE/LIFESPAN Cockspur Hawthorn grows at a fairly slow pace and has a lifespan of 75 - 100 years.

DISEASES/INSECTS The tree is subject to frequent attack by diseases and insects. The most frequently observed diseases are Cedar Hawthorn Rust, blight and many other forms of rust. Cockspur Hawthorn comes under attack from numerous insects, including aphids, borers, lace bugs and apple leaf blotch miners.

OTHER DAMAGING AGENTS

ROOT SYSTEM The plant has a taproot system.

HABITAT The plant grows best in lowland areas and on lower slopes to an elevation of 2,000' (610 m).

SOIL REQUIREMENTS The tree grows in moderately coarse to finely textured soils, many of which are loams. The plant has intermediate resistance to soil compaction and is adaptable to pH's in the range of 6.1 - 8.0.

SUN/SHADE Cockspur Hawthorn is intolerant of shade.

COMPETITIVENESS

WILDLIFE VALUE The tree has intermediate wildlife value. The fruits are eaten more than 20 bird species, including cedar waxwings, fox sparrows and ruffed grouse. The fruits are also eaten by rodents, and the twigs and leaves are browsed by whitetail deer. The plant sometimes forms dense shrubs that provide cover for birds and small animals.

WOOD CHARACTERISTICS

PRODUCTS

ADDITIONAL COMMENTS The tree has ornamental value and is used as a hedge or barrier. Thornless varieties are available.

DOWNY HAWTHORN

(*CRATAEGUS MOLLIS*)

HEIGHT/SPREAD/DBH The tree reaches a height of 20 - 40' (6 - 12 m) and its spread is greater than its height. The diameter (DBH) of mature trees is as large as 1' (0.3 m).

FORM The tree has a rounded crown and tall bole. Thick spines protrude from the branches. The length of the spines and their number varies greatly from tree to tree.

FOLIAGE The plant's common name is derived from the soft texture of its leaves as they emerge in mid May. In the Fall, the bright, yellowish-green leaves turn bronze, yellow or red.

FLOWER The tree blooms in May - June, shortly after its leaves have emerged. The species is monocious, producing large clusters of white, ill-scented flowers. Downy Hawthorn is the first Hawthorn in bloom.

FRUIT The tree produces clusters of black-dotted, dark red berries which mature from late August - September. The ripened fruits drop quickly.

RANGE Downy Hawthorn is native to the eastern fringe of the Great Plains. The tree's range extends from the southeastern corner of North Dakota to the northeastern section of Oklahoma. In Nebraska, its range extends westward, into the central portion of the state. The tree is planted in USDA zones 3b - 6.

MOISTURE REQUIREMENTS *Crataegus Mollis* grows under a wide range of moisture regimes. The tree grows best in moist soils and has intermediate flood tolerance, but it is also resistant to drought, and grows in dry, excessively drained soils.

GROWTH RATE/LIFESPAN Downy Hawthorn is a slow growing species, with a life span of 75 - 100 years.

DISEASES/INSECTS Like all Hawthorns, Downy Hawthorn is subject to frequent insect and disease problems. Apple Cedar Rust is the most frequent disease afflicting Downy Hawthorn.

OTHER DAMAGING AGENTS

ROOT SYSTEM The tree develops a taproot system which makes it difficult to transplant young specimens.

HABITAT Downy Hawthorn grows in lowland and upland areas. The tree has been observed at elevations as high as 1,500' (457 m).

SOIL REQUIREMENTS The tree grows in moderately coarse loams to fine clays. It is found in soils whose pH's range from 6.1 - 8.0, and it has intermediate resistance to soil compaction.

SUN/SHADE Downy Hawthorn is intolerant of shade.

COMPETITIVENESS

WILDLIFE VALUE The tree has intermediate value to wildlife. The fruits are eaten by songbirds and upland ground birds. The leaves and twigs are browsed by animals.

WOOD CHARACTERISTICS

PRODUCTS

ADDITIONAL COMMENTS Downy Hawthorn is one of the largest Hawthorn species.

PERSIMMON

(*DIOSPYRUS VIRGINIANA*)

HEIGHT/SPREAD/DBH Persimmons commonly grow 30 - 60' (9 - 18 m) tall, with a spread of 20 - 35' (6 - 10.5 m). Mature Persimmon trees have a DBH of 1 - 2' (0.3 - 0.6 m). Under optimum conditions, the tree may grow as tall as 70 - 80' (21 - 24 m).

FORM Persimmon trees have narrow crowns, with a long, straight bole. Persimmons can also be grown as a shrub.

FOLIAGE The leaves emerge in late May and mature to a dark green color. In the Fall, they may turn yellow, yellow-green or reddish purple. The leaves drop in early October.

FLOWER Persimmons are generally dioecious, although some trees are monecious. The tree produces inconspicuous flowers between March and June. Staminate flowers are arranged in clusters of two or three, while pistillate flowers are solitary. A ratio of 23 female trees per male is sufficient for pollination. The flowers are fragrant and especially attractive to bees.

FRUIT The tree produces edible fruit which is widely marketed. The fruits mature from September to November but have an astringent taste at maturity, due to their high tannin content. Persimmon fruits develop their sweet taste after the first frost, which wrinkles the skin and softens the pulp. Many cultivars are available, some of which do not require frost treatment.

RANGE *Diospyrus virginiana* is primarily a southern species, which is native to the eastern to central areas of Kansas, Oklahoma and Texas. The tree can be planted in USDA zones 4 - 9.

MOISTURE REQUIREMENTS The tree grows best in moist, well-drained soils, but it is also tolerant of drought conditions. Persimmons have an intermediate resistance to flooding, but prolonged inundation can kill young trees and seedlings.

GROWTH RATE/LIFESPAN Persimmons grow slowly and generally have a short lifespan. The trees reach maturity within 75 years and usually live past the age of 100.

DISEASES/INSECTS The tree has few insect problems, although it is attacked by a number of species. Persimmon Wilt is the most serious disease that affects Persimmon trees. The disease occurs predominantly in the southeastern United States.

OTHER DAMAGING AGENTS

ROOT SYSTEM The tree develops a strong and deep taproot which makes Persimmons difficult to transplant. The tree's root system sprouts many suckers which can form dense thickets.

HABITAT The plant does well in moist lowland or dry upland situations. Persimmons grow to 3,500' (1067 m) in elevation.

SOIL REQUIREMENTS Persimmons grow best in medium to moderately fine textured soils. They require slightly acid soils with a pH range of 6.1 - 6.5. The tree has an intermediate level of tolerance to soil compaction and is found in soils belonging to the Alfisol, Ultisol, Entisol and Inceptisol orders.

SUN/SHADE Persimmons are very tolerant of deep shade and can persist in the understory for many years.

COMPETITIVENESS Persimmons are widely spread by birds and animals and grow wild in pastures, ditches and fence lines across their native range. Persimmons are highly competitive and are considered noxious in many areas. Extensive research has been done to control Persimmon growth with herbicides.

WILDLIFE VALUE Persimmons are an extremely valuable source of food and cover for wildlife. Many birds and animals eat the fruit, including crows, wild turkey, bobwhite, raccoons, skunks, white-tailed deer, squirrels, rabbits, hogs and cattle. The fruit may cause sickness in cattle which also graze the sprouts.

WOOD CHARACTERISTICS Persimmon wood is extremely hard and durable. The dark brown wood is very heavy and has a tight grain.

PRODUCTS Persimmon is an attractive wood, but it is not widely used, because its lumber quality is poor. The wood has been used in golf clubs, in the past, because of its strength and weight, but this use has been largely superseded. The wood is also used for veneers, billiard cues, flooring and firewood. Persimmon fruits are eaten raw and used in baked goods and beverages. The fruit is high in carbohydrates and make an excellent hog feed. Bees are attracted to Persimmon flowers, and the tree is used for honey production.

ADDITIONAL COMMENTS The tree is often planted as an ornamental species, and is useful for erosion control because of its deep taproot.

WHITE ASH

(*FRAXINUS AMERICANA*)

HEIGHT/SPREAD/DBH Mature White Ashes grow 50 to 80' tall (15 -24 m). Their spreads are approximately equal with their heights. Large White Ashes have diameters (DBH's) as large as 2' (0.6 m).

FORM The tree's canopy is conical or oval to rounded.

FOLIAGE White Ashes have compound leaves that emerge in early May. The emergent leaves' color changes from light too bright green, and in the Fall they turn golden yellow, purple or maroon. The leaves drop between late September and late October, soon after the first hard frost.

FLOWER White Ash is dioecious, producing clusters of inconspicuous flowers that bloom in April and May. Stamine trees release their wind-borne pollen over a 3 - 4 day period. It travels up to 325' (100 m).

FRUIT White Ash trees produce fruit as early as the age of 20. The fruit is a single samara or "key" which reaches maturity in early August and may persist as late as mid February. The released fruits are carried on the wind and travel up to 500' (150 m).

RANGE The tree is native to the eastern fringes of Nebraska and Kansas and eastern and central portions of Oklahoma and Texas. White Ash is planted in USDA zones 3b - 9.

MOISTURE REQUIREMENTS White Ash trees have mean soil moisture requirements. They have intermediate resistance to flooding and drought and grow best in slightly moist soils.

GROWTH RATE/LIFESPAN Young specimens grow slowly. Their growth rate quickens after they pass through the sapling stage. White Ashes survive longer than other Ashes and commonly reach 200.

DISEASES/INSECTS White Ash is attacked by a comprehensive list of diseases and insects. They include leaf spot fungi, anthracnose, ring spot viruses, rust, canker, rot, scale, sawflies, tent caterpillars, moths and beetles. The most serious threat to the tree is Ash decline, or Ash dieback. This disease is believed to result from multiple causes, and is most likely to occur between 45 and 39 degrees latitude. Within the Great Plains, this area includes the northern half of Kansas, all of Nebraska and the lower half of South Dakota.

OTHER DAMAGING AGENTS The tree is very sensitive to air borne industrial pollutants.

ROOT SYSTEM The root system of White Ash starts out as a tap root. It later divides into several large vertical roots. Eventually, large lateral roots branch from the verticals at irregular intervals.

HABITAT White Ashes grow within the plain midrange between lowland areas and upland slopes. The tree grows to 1,970' (600 m) in elevation.

SOIL REQUIREMENTS The tree prefers soils that are moderately fine in texture, so its roots can penetrate the surface horizon. Under optimum soil conditions, the root system grows to a depth of 16" (40 cm) or more. The tree also grows in moderately coarse soils, but these roots are distributed throughout the surface horizon. White Ashes are found in Alfisol, Spodosol and Inceptisol soils. The tree has intermediate tolerance to soil compaction and prefers a pH level between 5.0 and 7.5.

SUN/SHADE White Ash seedlings are very tolerant of shade and capable of living in areas that receive as little as 3% of total sunlight. Under these conditions, they grow very slowly and seldom reach adult size. Seedlings that receive adequate sunlight grow much faster. White Ashes respond quickly to release and lose their shade tolerance as they grow older. Mature White Ashes are classified as shade intolerant.

COMPETITIVENESS White Ash requires competition to in order to produce marketable lumber. Competing trees shade the lower branches which eventually fall. This results in a mature tree with a tall bole.

WILDLIFE VALUE White Ash seed is eaten by many birds including purple finch, pine grosbeak, bobwhite, quail, turkey, grouse, cardinals and wood ducks. The bark, leaves and stems are eaten by rabbits, beaver, porcupine, white-tail deer and cattle.

WOOD CHARACTERISTICS The wood is light colored and very hard. White Ash is useful for athletic equipment because of its light weight and high degree of shock resistance.

PRODUCTS White Ash lumber is marketed as "Ash," along with other Ash species. "White Ash" is the term used to describe wood of the highest quality. Ash has a wide range of commercial uses. It is used in furniture, veneer, paneling, doors, cabinetry, musical instruments, implement handles and is a high quality firewood.

ADDITIONAL COMMENTS White Ash is a shade and ornamental species. Autumn Purple Ash, which is a White Ash cultivar, is a popular ornamental species.

BLACK ASH

(*FRAXINUS NIGRA*)

HEIGHT/SPREAD/DBH Large Black Ashes grow from 60 - 70' (18 - 21 m) tall and have a narrow spread which is approximately 1/3 of their height. Mature specimens have a diameter (DBH) of 12 - 24" (30- 61 cm.).

FORM The tree has a tall, narrow crown.

FOLIAGE The leaves that emerge in early May mature to a dark green color. The pinnately compound leaves turn brown or reddish purple before falling in late September.

FLOWER Black Ashes are polygamous and produce clusters of inconspicuous flowers in May or June.

FRUIT The tree produces clusters of single-seeded samaras that mature between June and September. The seeds are dispersed from July to October or persist through mid-Winter. The fallen seeds usually do not germinate until the second year and remain viable for up to eight years.

RANGE Black Ash is a northern species that is native to southeastern Manitoba. The tree is planted in USDA zones 2 - 5.

MOISTURE REQUIREMENTS Black Ash is an excellent flood plain species which is highly tolerant of flooding. It grows best in running waters and nearby soils with very high water tables. Black Ash is commonly associated with wetland areas, but also tolerates drought.

GROWTH RATE/LIFESPAN Black Ash grows slowly and has a short lifespan. It seldom lives more than 100 years.

DISEASES/INSECTS The tree is subject to many of the disease and insect problems common to *Fraxinus* species. The list includes: trunk and butt rot, leaf spot, anthracnose, rust, scale and cankers.

OTHER DAMAGING AGENTS

ROOT SYSTEM The tree's fibrous root system is very shallow.

HABITAT Black Ashes are common to low, wetland areas. It grows to 3,500' (1067 m) in elevation.

SOIL REQUIREMENTS The plant grows in soil textures ranging from moderately coarse to fine. Black Ash resists soil compaction, and is found in soils of the Histosol and Entisol orders. The tree grows across a wide pH range that extends from 4.4 - 8.2.

SUN/SHADE Black Ashes are intolerant of shade.

COMPETITIVENESS

WILDLIFE VALUE Black Ash fruit is eaten by many bird species including ducks, grouse and turkey. If there are no Poplars nearby, white-tail deer and moose browse heavily on young specimens. Trees as large as 20" (51 cm) in diameter (DBH) are cut down by beavers.

WOOD CHARACTERISTICS The tree's sapwood is light brown and the heartwood is darker. The wood is close grained and it has medium weight and strength. It is a darker wood than White Ash and sometimes marketed as Brown Ash. The wood is lighter than White Ash and not as strong.

PRODUCTS Black Ash wood is used in basketry because it splits easily. The wood is preferred to White Ash in cabinetry. High grade Black Ash is used for veneer, interior trim and furniture.

ADDITIONAL COMMENTS Fallen Black Ash leaves contain above average levels of nitrogen, calcium, magnesium and ash.

GREEN ASH

(*FRAXINUS PENNSYLVANICA*)

HEIGHT/SPREAD/DBH In the northern portion of its range, a fully grown Green Ash grows 50 - 60' tall (15 - 18 m) with a diameter (DBH) of 1.5' (0.5 m). In southern areas, the tree grows to 120' (37 m). Green Ash's spread is roughly one half its height.

FORM The tree has a tall trunk and dense, irregular crown.

FOLIAGE The leaves emerge in early May and mature to a shiny, dark green. In Autumn, they turn yellow-orange, before falling in early October.

FLOWER Green Ashes are dioecious, bearing clusters of apetalous flowers between March and May. Male trees shed pollen over a 3 - 4 day period and it is carried up to 300' (90 m) by the wind. The pistillate flowers are especially sensitive to late Spring frosts.

FRUIT The species produces clusters of samaras that mature within a month. The embryos within them develop more slowly, however, and the samaras' color changes from light green to yellow or brown as the embryos reach maturity in late September or early October.

RANGE Green Ash has the widest distribution of any North American Ash. Its range extends from mid Saskatchewan and Manitoba to the eastern half of Texas and includes all of the Great Plains except for Colorado, New Mexico, the west half of Texas and small portions of Wyoming, Nebraska, Kansas and Oklahoma. The tree grows in USDA zones 2 - 9.

MOISTURE REQUIREMENTS Green Ash grows in a wide range of moisture regimes. The tree tolerates periods of flooding lasting for up to 40% of the growing season, and also resists drought. It grows best in wet, poorly drained soils.

GROWTH RATE/LIFESPAN The tree grows quickly, reaching 30" (76 cm) within two years. Green Ashes have a fairly short lifespan that extends from 100 - 150 years.

DISEASES/INSECTS Green Ashes are more prone to insect problems than disease. They are attacked by many species, including scale, carpenter worms, sawfly and ash sawfly and ash borers. Their short list of diseases includes anthracnose, leaf spot, rust and root rot.

OTHER DAMAGING AGENTS

ROOT SYSTEM The tree has a shallow root system of fibrous roots that extend up to 48' (15 m) from the bole. During flooding, the tree develops secondary roots from its primary root and adventitious roots grow along submerged stems. The tree's far-reaching root system gives it extra wind firmness.

HABITAT The tree is most commonly found in bottomland areas where it lines waterways. They also grow in dry upland areas from wind-blown seed. The tree grows to 3,000' (914 m) in its southern range.

SOIL REQUIREMENTS The plant grows in coarse to medium textured sandy loams of the Inceptisol and Entisol orders. Green Ashes are resistant to soil compaction and require slightly alkaline soil ranging from 7.5 - 8.0 in pH.

SUN/SHADE Green Ashes' shade tolerance varies widely. In the north, seedlings are only moderately tolerant. Southern trees are shade tolerant as seedlings, but lose tolerance as they grow older.

COMPETITIVENESS Seedlings respond quickly to release, and Green Ash competes with weeds and vines more successfully than other tree species. They grow best in soils that have never been cultivated.

WILDLIFE VALUE The seed is eaten by many birds, including woodducks, cardinals and finches. They are also eaten by squirrels. The leaves and stems are browsed by mule deer and white-tailed deer. Cottontail rabbits and snowshoe hares devour seedlings.

WOOD CHARACTERISTICS The wood is light colored and has a straight-grain. It is heavier than White Ash.

PRODUCTS Green ash lumber is lower in quality than White Ash, but the wood is a higher grade of fuelwood, because of its added weight. Green Ash wood is used to make tool handles, furniture, athletic equipment and cabinetry.

ADDITIONAL COMMENTS The tree is a popular ornamental and many male cultivars are available.

VELVET ASH

(*FRAXINUS VELUTINA*)

HEIGHT/SPREAD/DBH Fully grown Velvet Ash reach 40' (12 m) in height, with approximately equal spreads. A mature specimen has a diameter (DBH) of 1' (0.3 m).

FORM The tree is one of the smaller Ash species. It has a rounded crown and spreading branches.

FOLIAGE Velvet Ash has pinnately compound leaves and variably shaped leaflets. The tree gets its name from the short-lived pubescent hairs on the underside of the leaflets in Spring. Their color changes from glossy green in Summer to yellow in Autumn.

FLOWER *Fraxinus velutina* is a dioecious species that produces clusters of inconspicuous flowers, early in the Spring. The flowers bloom before leaf emergence.

FRUIT The tree produces densely clustered fruits that mature in early September. The fruits are attached to long keys that turn light brown as the fruit reaches maturity.

RANGE Velvet Ash is a southwestern species that is native on scattered sites from western Texas to eastern New Mexico.

MOISTURE REQUIREMENTS The plant is common to moist soils found along mountain streams. The tree is also highly drought resistant and grows in dry, desert soils.

GROWTH RATE/LIFESPAN Velvet Ash is a fast growing species.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM The tree has a phreatic root system that extends to the water table.

HABITAT Velvet Ashes usually grow in moist soils along streams. In dry desert soils they are found above permanent supplies of groundwater. The tree grows to 6,000' (2,000 m) in elevation.

SOIL REQUIREMENTS The tree grows in neutral to alkaline soils.

SUN/SHADE Velvet Ashes have a low degree of shade tolerance.

COMPETITIVENESS The tree grows in association with Pine and Cottonwood trees and also in pure stands.

WILDLIFE VALUE The fruit is not widely eaten by wildlife. Animals and birds, including evening and pine grosbeaks, detach the seeds before eating them. The leaves and twigs are browsed by larger animals in early Spring and late Fall.

WOOD CHARACTERISTICS The wood is light colored with a close grain. Velvet Ash wood is hard and dense, but not especially strong.

PRODUCTS The wood is used for tool handles and fuelwood.

ADDITIONAL COMMENTS Velvet Ash is planted as an ornamental shade tree and in shelterbelts. Commercial cultivars are available.

ARIZONA WALNUT

(JUGLANS MAJOR)

HEIGHT/SPREAD/DBH A fully grown Arizona Walnut grows 30 - 50' (9 - 15 m) with a slightly broader spread. The tree's diameter (DBH) extends from 1 - 2' (0.3 - 0.6 m). There are very few full-size trees left, however, and most of the existing trees are considerably smaller.

FORM The tree has a forked trunk and rounded crown with lateral to ascending branches.

FOLIAGE The yellow-green leaves are pinnately compound and have a distinctive odor when crushed.

FLOWER The tree is monoecious and blooms in early Spring. The male flowers are drooping, hairy catkins with multiple stamens. The female flowers are in 1 - 3 flowered spikes, located at the tip of new growth.

FRUIT Small, sweet-tasting fruits are enclosed by a thin brown husk and a hard shell.

RANGE The tree is native to scattered sites across eastern New Mexico and west Texas.

MOISTURE REQUIREMENTS The tree grows in conditions ranging from moist, poorly drained soils to dry, excessively drained soils.

GROWTH RATE/LIFESPAN Young Arizona Walnuts grow quickly, but their rate of growth slows later. The tree has a lifespan of more than 400 years.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM Arizona Walnut has a taproot system that extends deep into the soil.

HABITAT The tree is found in dry mountain soils and along upland streams. It grows from 2,000 - 7,000' (610 - 2134 m) in elevation.

SOIL REQUIREMENTS

SUN/SHADE The tree requires full sun.

COMPETITIVENESS The seed has a fairly low germination rate (30 - 50%) which limits the seedlings population.

WILDLIFE VALUE The tree produces small nuts which are eaten by squirrels and other small rodents.

WOOD CHARACTERISTICS The heartwood is dark brown and the sapwood is light colored. The wood is hard and very heavy.

PRODUCTS The wood is used for furniture, veneer, gunstocks, fenceposts and firewood. The tree produces sweet-tasting nuts.

ADDITIONAL COMMENTS The supply of wood is very low because of the tree's limited range and the high demand which has caused many of the larger specimens to be cut down. The tree is planted as a shade and ornamental species. Arizona Walnut hybridizes with Little Walnut (*Juglans microcarpa*) in areas where their ranges overlap.

LITTLE WALNUT

(*JUGLANS MICROCARPA*)

HEIGHT/SPREAD/DBH The tree grows 10 - 30' (3 - 9 m) in height and spread with a diameter (DBH) of 6 - 18" (0.15 - 0.5 m).

FORM Little Walnut is a small tree or large shrub. The plant has many large branches which originate near the ground.

FOLIAGE The yellow-green leaves of Little Walnuts are pinnately compound and turn yellow in the Fall. The narrow leaflet resembles a scythe and has a distinctive aroma when crushed.

FLOWER The tree is monoecious and produces flowers in March and April. Male flowers are arranged in long catkins on the previous year's growth. The female flowers are in spikes of 1 - 4 flowers that appear on new growth.

FRUIT Little Walnut has the smallest fruits of the Walnut family. The marble size fruits are edible and have a thin green husk which turns dark brown as the fruit matures in early Fall. The hard shelled nuts are in clusters of 2 - 3.

RANGE The tree occurs on scattered sites throughout Oklahoma, eastern New Mexico and central and western Texas.

MOISTURE REQUIREMENTS The tree grows in moist, stream side soils and dry desert conditions. Little Walnut has a high degree of drought tolerance.

GROWTH RATE/LIFESPAN The tree grows slowly at first and directs its energy toward the development of a root system.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM Little Walnuts have a deep taproot that sustains the tree through long periods of drought.

HABITAT The tree is found in moist, stream side soils and dry upland areas. It grows from 1,500' - 4,000' (457 - 1219 m) in elevation.

SOIL REQUIREMENTS

SUN/SHADE Little Walnut requires full sun and is very intolerant of shade.

COMPETITIVENESS

WILDLIFE VALUE The fruits of Little Walnut are a valuable food source for squirrels and smaller rodents.

WOOD CHARACTERISTICS The heartwood is dark brown and the sapwood is creamy white. The wood is hard and heavy but it lacks the characteristic strength of Walnut species.

PRODUCTS The wood is used for furniture, cabinetry, paneling and veneers.

ADDITIONAL COMMENTS Little Walnut trees are used in shelterbelts and for shade and ornament. The tree hybridizes with the Arizona Walnut (*Juglans major*) in areas where their ranges overlap.

BLACK WALNUT

(*JUGLANS NIGRA*)

HEIGHT/SPREAD/DBH Mature Black Walnut trees grow 70 - 90' (21 - 27 m) tall, with a spread roughly equal to their height. The diameter (DBH) of a fully grown tree is 2 - 4' (0.6 - 1.2 m). Under optimum conditions, Black Walnut trees grow as tall as 125 - 150' (37 - 45 m).

FORM Black Walnuts are large trees with tall, straight boles and rounded crowns.

FOLIAGE The light green leaves, which emerge in late May, are pinnately compound. They mature to a dark glossy green and turn golden yellow in the Fall.

FLOWER *Juglans nigra* is a monoecious species, whose flowers bloom between mid April and mid June. Black Walnuts are dichogamous, and in most cases, the female flowers bloom earlier. The tree is capable of self-pollination, if the surrounding trees do not pollinate it.

FRUIT The fruits, which ripen from September - October, have an indehiscent outer husk that turns dark brown at maturity. The fruit drops from the tree, soon after the leaves have fallen, and its husk rots away, exposing the hard outer shell. Walnuts produce a large nut crop by the age of 30, with peak production extending over the next 100 years.

RANGE The tree's range extends across the eastern half of the Great Plains from Nebraska to Texas. Black Walnut is planted in USDA zones 4b - 9.

MOISTURE REQUIREMENTS The Black Walnut tree grows in a wide range of moisture conditions. It is moderately flood tolerant, and mature specimens withstand periods of continuous inundation lasting from 90 - 150 days. The tree grows best in moist, well-drained soils but also tolerates drought conditions.

GROWTH RATE/LIFESPAN Young Black Walnut seedlings grow 36 - 48" (91 - 122 cm) per year under ideal conditions. On dry soils, they grow more slowly, but 40 - 50' (12 - 15 m) of growth in 20 years has been recorded. Black Walnut is a long-lived tree that reaches maturity by the age of 150 and commonly lives to 250.

DISEASES/INSECTS The tree is attacked by several hundred insect species, but only a few present serious problems. The list includes walnut caterpillars, boring insects, the walnut curculio, walnut shoot moth and aphids. Black Walnut is only susceptible to a few diseases, but they represent serious threats to its health. The list includes root rot diseases, walnut anthracnose, target leafspot and cankers.

OTHER DAMAGING AGENTS Animals often damage Black Walnuts by stripping their bark, gnawing off stems, digging up seeds and browsing. Temperature fluctuations in late Winter and early Spring cause them to break buds too early and it kills new growth.

ROOT SYSTEM Black Walnut has both a taproot and lateral root system. Development of the taproot occurs quickly, especially in dry soils. Lateral roots develop thereafter. The overall shape and structure of the root system is dependent on the depth of the soil and the level of competition that exists.

HABITAT The tree grows in moist, lowland soils and in dry upland areas to an elevation of 4,000' (1,219 m).

SOIL REQUIREMENTS Black Walnut grows in Alfisol and Entisol soils with textures ranging from moderately coarse sandy loams to moderately fine silt loams. The tree requires neutral to slightly alkaline soils within a pH range of 6.6 - 8.0. Black Walnut has an intermediate level of tolerance to soil compaction and grows best in deep soil without a fragipan.

SUN/SHADE The tree is intolerant of shade.

COMPETITIVENESS Black Walnut roots secrete juglone, a toxic substance that limits the germination and growth of other plants. Juglone is also found in leaves, bark and fruit husks. Black Walnut responds quickly to crown release and control of annual weeds is very important to establishment. The depth of the lateral roots is dependent on competition. In pure stands, the roots are very shallow. They grow deeper when the tree is competing with shallow-rooted species like Ash.

WILDLIFE VALUE The tree is browsed by white-tailed deer. Walnuts are a very important food source for squirrels.

WOOD CHARACTERISTICS *Juglans nigra* is the most valuable North American lumber species. The heartwood color ranges from light to dark chocolate brown and the sapwood, which is lighter, is stained to match it. Walnut is hard, straight grained and quite heavy. Irregularly patterned grains, which are found in burls, crotches and stumps, are especially valuable.

PRODUCTS Black Walnuts are used in many foods, and industry uses Walnut shells in products like abrasives and dynamite filler. The wood is heavily used for furniture, cabinetry, paneling, veneers and millwork. Burled Walnut is used extensively in gunstocks for its appearance and high degree of shock absorbance. Walnut is a source of high quality firewood and long-lasting poles and fence posts.

ADDITIONAL COMMENTS Black Walnut is an ornamental species. Many cultivars have been developed on the basis of their nut characteristics.

ROCKY MOUNTAIN JUNIPER

(JUNIPERUS SCOPULORUM)

HEIGHT/SPREAD/DBH Rocky Mountain Junipers grow 20 - 50' tall (6 - 15 m) with diameters (DBH's) of 1 - 1.5' (0.3 - 0.5 m).

FORM The tree has a slender conical crown and multiple stems.

FOLIAGE The scalelike needles are light grayish green to dark bluish green.

FLOWER Greenish yellow, inconspicuous flowers develop during the Summer and open the following Spring between mid April and mid June. Rocky Mountain Juniper is dioecious.

FRUIT The fruits are berry-like conelets that reach maturity between mid September and mid December of their second season. They persist through the following Spring or longer. Mature fruits are distinguishable by their bluish purple color and waxy coat of bloom.

RANGE The tree is native to scattered sites across the western half of the American Great Plains. Rocky Mountain Juniper grows in USDA zones 3 - 7.

MOISTURE REQUIREMENTS The tree quickly establishes itself in moist, poorly drained soil. It has difficulty getting started in dry soil, but once established, it is very drought tolerant.

GROWTH RATE/LIFESPAN The plant is very slow growing and often lives 300 years or more.

DISEASES/INSECTS Rocky Mountain Junipers are prone to a very wide range of diseases and insects. The tree is an alternate host to cedar-apple rust, and many shelterbelts have lost trees to a blight caused by *Cercospora sequoiae*. They are attacked by arachnids, nematodes and mites and are hosts to Coleoptera, Lepidoptera, Diptera and Phyllids. Insects damage all parts of the tree.

OTHER DAMAGING AGENTS Young Rocky Mountain Junipers are frequently damaged by animals, which favor them as rubbing posts. The plant is highly susceptible to fire due to its thin bark and the volatile oils contained in the lowest branches of the tree.

ROOT SYSTEM The root system is a far-reaching network of lateral roots whose depth is determined by the depth of the soil. The tree adapts to shallow, fragipan soils.

HABITAT The tree is often found in rocky, erosive soils and grows to 9,000' (2,743 m) in elevation.

SOIL REQUIREMENTS The plant requires slightly alkaline soils and is adaptable to a wide range of Mollisol soils.

SUN/SHADE The tree tolerates shade through its sapling stage, but needs full Sun by the time it reaches maturity.

COMPETITIVENESS Once established, *Juniperus scopulorum* competes successfully for water and nutrients. The tree controls the growth of other vegetation by allelopathy.

WILDLIFE VALUE The berries are eaten by many birds including turkeys, bohemian waxwings, evening grosbeaks, robins and a variety of Jays. The tree is browsed or "high-lined" by antelope, mule deer, bighorn sheep and domestic sheep when little else is available.

WOOD CHARACTERISTICS The wood is aromatic, resists decay and has a fine grain. The heartwood has a deep red color characteristic of Junipers, while the sapwood is very light. Rocky Mountain Juniper wood is lighter than Eastern Red cedar.

PRODUCTS The tree only produces lumber in small quantities because of its multi stemmed habit. The wood is used to line closets and make custom made furniture. It is also used for fenceposts, firewood and carving.

ADDITIONAL COMMENTS The tree hybridizes with Eastern Red cedar (*Juniperus virginiana*) in areas where their ranges overlap. It is planted as an ornamental.

EASTERN RED CEDAR

(*JUNIPERUS VIRGINIANA*)

HEIGHT/SPREAD/DBH The tree grows 40 - 60' (12 - 18 m) tall and has a spread of 30 - 45' (9 - 13.5 m). The trunk is 1 - 2' (0.3 - 0.6 m) in diameter (DBH).

FORM The species' form varies between a narrow, columnar habit and a broad, pyramidal crown.

FOLIAGE The leaves are scalelike needles. Their color ranges from a dark to grayish, blue green.

FLOWER The tree is dioecious, and wind pollination occurs in late Winter and early Spring. Male conelets turn yellowish brown at maturity and the female conelets, which are smaller, are green.

FRUIT The berry-like cones reach maturity between late July and mid November. Their color changes from green to white and finally blue as the seed develops. The cones do not open and may persist until late Winter. The tree produces seed by the age of ten with large crops every two or three years.

RANGE *Juniperus virginiana* is the most widely distributed conifer in the eastern United States. Its native range stretches across the eastern and central Great Plains from South Dakota to Texas and it grows in USDA zones 2 - 9.

MOISTURE REQUIREMENTS The species' moisture tolerance ranges from moist, poorly drained soil to drought conditions. Eastern Red Cedar does not tolerate flooding.

GROWTH RATE/LIFESPAN The tree grows at a slow to a medium pace. Its maximum lifespan is 300 years.

DISEASES/INSECTS The tree is attacked by many insects, but they inflict little serious damage. The list includes nematodes, grubs, beetles, borers and weevils. The roots are especially susceptible to rot fungi that are associated with insect damage and stress conditions. The species is an alternate host to Cedar Apple Rust and other types of cedar rust.

OTHER DAMAGING AGENTS The bole is easily injured by fire because of its thin bark and the shallow root system is also susceptible. The foliage is protected, however, because it does not burn easily. Seedlings may be damaged by frost-heaving, and specimens of all sizes are sensitive to ice damage.

ROOT SYSTEM The type of root system that develops depends on the depth of the soil. In deep soil, a taproot develops. In shallow, rocky soils, it has fibrous roots. The growth of lateral roots takes precedence over the tree's top growth.

HABITAT The species grows anywhere from dry upland areas, especially those with limestone soils, to floodplains and swamps. Eastern Red Cedar grows to 3,500' (1,070 m) in elevation and is seldom found below 100' (30 m).

SOIL REQUIREMENTS *Juniperus virginiana* grows in all categories of soil texture and is very sensitive to compacted soils. The plant is native to soils of the Mollisol and Ultisol orders and requires a pH level between 4.7 and 7.8. The soil around the tree tends to become neutral or slightly alkaline because the fallen needles have a high calcium concentration that alters soil pH.

SUN/SHADE Young Eastern Red Cedars have intermediate shade tolerance, but as they become older they grow intolerant of shade.

COMPETITIVENESS Once established, the tree is a very successful competitor. Eastern Red Cedar has a longer season than many deciduous species and it may adjust to changing light levels as surrounding trees lose their leaves. It is also well equipped to survive drought.

WILDLIFE VALUE The species is very useful to wildlife. The seed is eaten and dispersed by many bird species, including waxwings, bobwhite, quail, ruffed grouse, pheasant, turkeys and mourning doves. They are also eaten by foxes, raccoons, skunks and opossums. The tree is browsed by deer, mice and rabbits. Cattle generally do not browse Eastern Red Cedar. The tree is also valued for nesting, roosts and escape.

WOOD CHARACTERISTICS Eastern Red Cedar is a lightweight aromatic wood that is very hard but brittle. The sapwood is light colored and the heartwood is orange to red.

PRODUCTS The wood is used in cedar chests, millwork, fenceposts and for lining closets. Cedar oil is used in perfumes and cleaning products. Eastern Red Cedar is a popular Christmas tree and aromatic firewood.

ADDITIONAL COMMENTS Eastern Red Cedar is often used in windbreaks and shelterbelts. The species' dense habit and fibrous root system combine to make it an excellent choice for erosion control. The tree hybridizes with Rocky Mountain Juniper (*Juniperus scopulorum*) in areas where their ranges overlap.

SWEETGUM

(LIQUIDAMBAR STYRACIFLUA)

HEIGHT/SPREAD/DBH Liquidambar styraciflua grows to a full height of 60 - 75' (18.0 - 22.5 m) with a spread of 40 - 60' (12.0 - 18.0 m). The mature tree has a diameter (DBH) of 1.5 - 3.0' (0.5 - 1.0 m).

FORM Young trees have a pyramidal outline, but as they age, their form becomes rounded.

FOLIAGE The broadly-lobed leaves emerge in late April and mature to a dark, glossy green. Their Fall color varies greatly with many shades of red, orange and purple found on one tree. The resinous leaves drop in late October.

FLOWER Sweetgum is a monoecious species whose inconspicuous, greenish flowers bloom between March and early May. The flowers are very sensitive to cold and are easily damaged by frost.

FRUIT Sweetgum fruits are syncarps resembling spiked balls that produce seed in many dehiscent capsules. The green, immature fruits turn light yellow as they reach maturity between September and November, and their tiny, winged seeds are quickly eaten by small birds or released on the wind. The emptied fruit balls often persist through Winter. Sweetgums begin to produce between the ages of 20 - 30. They produce a large crop every second or third years to the age of 150.

RANGE The plant is native to southeastern Oklahoma and east Texas. Sweetgum is planted in USDA zones 5 - 9.

MOISTURE REQUIREMENTS Sweetgum is a flood tolerant species which grows in wet to moist, poorly drained soils to drier areas. The tree has intermediate drought tolerance.

GROWTH RATE/LIFESPAN The species grows at a moderately fast pace and reaches maturity by 150. They live to 300 years.

DISEASES/INSECTS Liquidambar styraciflua has few diseases or insect problems of a serious nature. The most common diseases are abiotic leader dieback, bleeding necrosis and sweetgum blight which is likely caused by drought. Iron chlorosis occurs in high pH soils. Leaf feeding insects, such as the forest tent caterpillar and luna moth, are the only type of insect that attack healthy specimens. Damaged or dying trees are attacked by various beetles.

OTHER DAMAGING AGENTS Damage to the sapwood by repeated Summer fires is one of the most serious threats to the tree. In areas where the sapwood has been killed, fire scars serve as entrance points for diseases and insects because the tree cannot produce enough gum to cover their wounds. Sweetgums are damaged by browsing livestock, rodents and beavers which girdle large trees. The species is usually resistant to strong winds.

ROOT SYSTEM The type of root system the tree develops is determined by site conditions. In moist soil, Sweetgum grows a deep taproot with heavy laterals. On wetter soils, it has a shallow root system without a taproot, and in dry upland areas, a very deep taproot. Sweetgum roots sprout prolifically, and a large number of stems may share a single root system.

HABITAT *Liquidambar styraciflua* is common to lowland floodplains and along streams. It grows to an elevation of 3,000' (914 m).

SOIL REQUIREMENTS The species requires moderately coarse to finely textured soils such as silt loams and alluvial clays. Its pH requirements are narrow and range from 6.1 - 6.5. Sweetgum resists soil compaction and commonly grows in soils of the Alfisol order.

SUN/SHADE Sweetgum does not tolerate shade.

COMPETITIVENESS Seedlings and younger specimens tolerate competition on good sites and respond quickly to release. Older trees are less competitive, having lost much of their regenerative capacity and may not respond to release. Sweetgum is a pioneer species in recently cleared areas.

WILDLIFE VALUE The seed is eaten by more than 20 bird species including cardinals and red-winged blackbirds. They are also eaten by squirrels, chipmunks and rabbits.

WOOD CHARACTERISTICS The reddish brown heartwood is called Redgum or Hazelwood. The light-colored sapwood is marketed as Sapgum. Figured Redgum, or Satin Walnut, is figured wood with darkly pigmented streaks. The wood often has an interlocked grain and its weight and hardness is moderate.

PRODUCTS Sweetgum is an important furniture species. The wood is used in cabinets, furniture, veneer, lumber, railroad ties, pulp and firewood.

ADDITIONAL COMMENTS Sweetgum is an ornamental species planted for its attractive Fall colors. It is widely planted in lumber plantations across the southern United States.

OSAGE-ORANGE

(MACLURA POMIFERA)

HEIGHT/SPREAD/DBH The tree usually reaches a height and spread of 35 to 50' (10 - 15 m) with a diameter (DBH) of 2' (0.6 m). On the best sites, Osage-Orange grows as tall as 70' (21 m) with an equivalent spread.

FORM Osage-Orange is a medium-sized tree with a short, often curved, bole and a broad crown.

FOLIAGE The tree's glossy foliage emerges in April and turns yellow before dropping in November. Stiff spines as long as 1/2" (1.25 cm) appear opposite the leaves.

FLOWER *Maclura pomifera* is a dioecious species whose inconspicuous flowers bloom between April and June, after the leaves have emerged.

FRUIT Osage-Orange produce large multiple fruits resembling oranges. The fruit reaches maturity in September and October and comprises fleshy, one-seeded drupelets. The trees start to bear fruit around the age of 10 and produce a good crop most years. If no male trees are present, the female trees produce seedless fruits.

RANGE The tree's native range is limited to eastern and central Texas and Oklahoma. However, *Maclura pomifera* is one of the most widely planted trees in the U.S. and grows in USDA zones 5a - 9.

MOISTURE REQUIREMENTS Osage-Orange tolerates a very wide band of moisture situations ranging from wet, occasionally flooded, soils to extremely dry conditions. It grows best in moist soils with average drainage.

GROWTH RATE/LIFESPAN The tree has a long lifespan and grows at the rate of 9 - 12' (3 - 4 m) in a five year period.

DISEASES/INSECTS Although Osage-Orange is highly resistant to diseases and insects, it is attacked by a number of damaging agents. The most common diseases are cotton root rot, witches' broom, verticillium wilt and damping-off. The only serious threat among these is cotton root rot which occurs in drier areas of the southern Great Plains. The tree is also attacked by borers, scale, leafrollers and mites.

OTHER DAMAGING AGENTS Osage-Orange is highly resistant to damage from winds, ice and snow. Prior to establishment, young trees must be protected from invasive weeds whose root systems compete aggressively for water and nutrients. Weeds also provide cover for rodents which girdle the stems. Weed removal protects seedlings and saplings from fire which easily destroys young Osage-Orange.

ROOT SYSTEM On native soils in Oklahoma and Texas, the tree has a deep taproot with an extensive lateral root system. Outside its native range, there is considerable variation in the depth and expansion of the roots. Lateral roots extend farther in soils overlaying limestone deposits.

HABITAT The tree grows in moist lowland sites as well as dry upland areas.

SOIL REQUIREMENTS Osage-Orange grows well in most types of soil, particularly silty and sandy loams. It grows poorly, however, on the exposed and eroded sites it often invades. The species' pH requirements range from slightly acid (6.1) to alkaline (8.0) and it is a good choice for alkaline soils. *Maclura pomifera* is sensitive to soil compaction and grows in soils of the Alfisol, Ultisol, Vertisol and Mollisol Orders.

SUN/SHADE The tree's tolerance to shade is debated, but the consensus is that it does not tolerate shade.

COMPETITIVENESS *Maclura pomifera* is an exceptionally tough tree, that once established, withstands widely varying conditions and grows on sites where other trees cannot survive. Osage-Orange usually produces a good crop, even on highly competitive sites.

WILDLIFE VALUE The fruits are eaten by squirrels and quail but ignored by most wildlife because of their bitter taste. The fruit is safely eaten by cattle, but young trees should be fenced to prevent browsing. The tree's greatest value to wildlife is the dense cover its leaves and thorns provide many birds and animals.

WOOD CHARACTERISTICS The wood is heavy, tough and durable. The light colored sapwood is very slender. The heartwood, which darkens with exposure, is golden yellow to orange and it has dark reddish streaks along the grain. It resists decay and shrinking and swelling.

PRODUCTS Osage-Orange is attractive and durable, but little used other than for finished work because of difficulty finding large pieces without cracks and shakes. The tree is used for products such as archery bows, crafts, fence posts, insulator pins and tree nails and makes one of the highest quality firewoods available.

ADDITIONAL COMMENTS The tree is widely planted in shelterbelts and windbreaks and makes an excellent single row windbreak or hedge.

WHITE MULBERRY

(*MORUS ALBA*)

HEIGHT/SPREAD/DBH White Mulberry grows to a height and spread of 30 - 50' (9 - 15 m) with a diameter (DBH) of 1' (0.3 m).

FORM The branches are packed densely to form a rounded crown.

FOLIAGE White Mulberry is most easily recognized by the varied shapes of its leaves, the margins of which range from unlobed to deeply lobed. A single tree contains many differently shaped leaves. They are dark green in Summer and turn light yellow in the Fall.

FLOWER *Morus alba* is a polygamo-dioecious species whose flowers are short greenish catkins that bloom in March and April.

FRUIT Mulberries are multiple fruits comprising many, single-seeded drupes. They reach maturity in June and July and range in color from pink to red or purple and occasionally white.

RANGE White Mulberry is a native of China that was introduced to America in the 1600's and has naturalized across much of the country. It grows in USDA zones 4 - 8.

MOISTURE REQUIREMENTS The tree prefers moist, well-drained soils but tolerates drier conditions and drought.

GROWTH RATE/LIFESPAN White Mulberry is a very fast growing tree.

DISEASES/INSECTS The tree is attacked by numerous diseases and insects, particularly in warmer climates. Leaf spots, blight, powdery mildew and witches brooms are its most common problems.

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT The plant grows best in moist, lowland areas but adapts to dry upland sites.

SOIL REQUIREMENTS The tree adapts to most types of soil.

SUN/SHADE White Mulberries grow in full sun to light shade.

COMPETITIVENESS White Mulberries are widely dispersed by the birds and animals which eat their fruit. The root systems of established trees resprout quickly after they are chopped down.

WILDLIFE VALUE Mulberries are eaten by many types of birds including cardinals, woodpeckers and orioles. They are also a favorite of raccoons, squirrels, opossums and other animals.

WOOD CHARACTERISTICS *Morus alba*'s light brown wood is high in density

PRODUCTS White Mulberry is a high quality firewood because of its density. The wood is also used for fenceposts and decorative carving. Mulberries are made into wine, baked goods and jelly.

ADDITIONAL COMMENTS Mulberries are sometimes planted to avert the attention of birds and animals from other fruits.

RED MULBERRY

(*MORUS RUBRA*)

HEIGHT/SPREAD/DBH Red Mulberry's height ranges from 15 - 60' (4.5 - 18.0 m). Its spread is roughly equivalent. A fully grown tree's diameter (DBH) extends from 1.0 - 2.5' (0.3 - 0.75 m).

FORM The tree has a short trunk and large, globular crown.

FOLIAGE The leaves emerge in mid May and are dark and glossy. In Fall, they turn light to golden yellow. Red Mulberry is distinguished from White Mulberry (*Morus alba*) by the uniformity of its leaves.

FLOWER The tree is usually dioecious, but monoecious specimens occur. The flowers are short catkins that bloom between March and May.

FRUIT Mulberries are aggregate fruits consisting of many drupelets. The fruits mature between June and August and their color ranges from red to purple or black.

RANGE The tree's native range extends from southeastern Nebraska through the eastern and central portions of Kansas, Oklahoma and Texas. Red Mulberry grows in USDA zones 5 - 9.

MOISTURE REQUIREMENTS The tree has intermediate tolerance to flooding and withstands a foot of water over a single season. It does not tolerate longer periods of flooding, however. Red Mulberry prefers moist soil with poor to average drainage but is very tolerant of drought.

GROWTH RATE/LIFESPAN Red Mulberry is a fast growing tree with a short lifespan. It reaches maturity by age 75.

DISEASES/INSECTS *Morus rubra* is frequently attacked by insects and diseases. The most common diseases are leaf-spot and witches broom. In recent years, many trees have been killed by an as yet unidentified disease which may be caused by bacteria. Most of the species' insect problems are attributable to mealybugs, borers and scale.

OTHER DAMAGING AGENTS Branches are frequently broken by wind, ice and snow due to weak wood.

ROOT SYSTEM The root system comprises either a taproot or deep laterals

HABITAT The tree grows in wet, lowland areas and drier uplands to an elevation of 2,000' (610 m).

SOIL REQUIREMENTS Red Mulberries are found in soils of the Alfisol, Inceptisol, Spodosol and Ultisol orders. Their pH requirements range between 6.3 and 8.0. They require moderately coarse to moderately fine, sandy and silty loams, and have intermediate tolerance to compacted soils.

SUN/SHADE The tree grows best in full Sun, but is often found in the understory where it has some shade tolerance.

COMPETITIVENESS Mulberry seeds are widely dispersed by the many birds and animals that eat the fruit. Red Mulberry is a tough, drought resistant tree.

WILDLIFE VALUE Mulberries are eaten by more than 40 bird species along with opossums, raccoons and squirrels.

WOOD CHARACTERISTICS The tree's yellowish wood is weak despite its hardness and heavy weight. The wood is durable and has a straight grain.

PRODUCTS The wood is used primarily in products such as fenceposts and firewood. It is also used in furniture to a limited extent. Mulberries are edible and are used in jellies and baked goods.

ADDITIONAL COMMENTS Mulberry trees are used to distract birds from other fruits. The tree is planted as an ornamental and often used in shelterbelts.

EASTERN HOPHORNBEAM

(*Ostrya virginiana*)

HEIGHT/SPREAD/DBH In most areas, the tree grows to a full height between 20 and 50' (6 - 15 m) with a spread of 15 - 35' (4.5 - 10.5 m), or 2/3 of the height. *Ostrya virginiana* reaches its greatest height in eastern Texas, where it grows as large as 60' (18 m).

FORM Young trees have a conical form, and they eventually develop a rounded crown with many horizontal and drooping branches.

FOLIAGE The leaves are dark reddish green when they emerge in early May. Over Summer, they turn light yellow green and are pale golden yellow in Fall. The leaves, which persist until mid Winter, have very low concentrations of phosphorous and potassium but moderate to high concentrations of nitrogen and calcium.

FLOWER *Ostrya virginiana* is a monoecious species whose flowers are short, reddish brown catkins. The male flowers are in groups of 1 - 3. They develop in late Summer and shed their pollen the following Spring. The female flowers are solitary and bloom between late March and mid June.

FRUIT The fruit is a singular, brown nutlet enclosed in a papery sac called a strobile. They are grouped in a hanging cluster, or strobilus. As the fruit reaches maturity between late August and October, the strobile break away, and the inflated sacs are carried on the wind or float downstream. They eventually shatter, releasing seed throughout the Fall and into winter. Eastern Hophornbeam begins to produce fruit around age 25.

RANGE The tree's native range extends along the eastern fringe of the Great Plains from Texas to Manitoba. It is also a native of the Black Hills region of South Dakota and the Niobrara River Valley which traverses northern Nebraska. *Ostrya virginiana* is planted in USDA zones 3 - 9.

MOISTURE REQUIREMENTS Eastern Hophornbeam requires intermediate moisture conditions. It does not tolerate flooding and it grows best in moist, well-drained soils. The tree tolerates dry soils and has moderate resistance to drought.

GROWTH RATE/LIFESPAN Across the course of its life, *Ostrya virginiana* has a slow to a medium rate of growth, but as a seedling, it grows very fast. Its lifespan is approximately 150 years.

DISEASES/INSECTS Trunk and butt rot, which cause defective growth, are the only serious problems the tree faces. The most common forms of rot are brown stains, yellow-brown stringy rot, white spongy rot and yellow rot. Witches' Brooms occasionally form on the tree.

OTHER DAMAGING AGENTS The tree is rarely damaged by wind, ice or snow but it is sensitive to industrial pollutants such as the oxides of sulfur, nitrogen, chlorine and fluorine.

ROOT SYSTEM The tree has a deep taproot which makes it difficult to transplant. Eastern Hophornbeam recovers slowly from transplant shock.

HABITAT *Ostrya virginiana* is a mid-range tree that grows on moist upland sites to an elevation of 4,500' (1,372 m).

SOIL REQUIREMENTS The tree grows in soils ranging from finely textured, heavy clays too moderately coarse, sandy loams. Its native soils belong to an unusually wide array of orders. The pH requirements of specimens planted in the northern half of its range vary between very acid (4.2) and slightly alkaline (7.6). In the mid-South, its pH requirements are much narrower, ranging from 4.6 - 5.6. *Ostrya virginiana* is sensitive to compacted soils.

SUN/SHADE Eastern Hophornbeam is an understory tree that reproduces on fully shaded sites.

COMPETITIVENESS The tree is capable of establishing itself in the full shade of a forest or on grassland sites where it successfully competes with fast growing vegetation. Damaged trees readily sprout from dormant buds along the bole.

WILDLIFE VALUE *Ostrya virginiana* is a favorite food of beavers, and the fruits are important to several birds including ruffed grouse, ring-necked pheasant and wild turkey. They are also eaten by squirrels. The tree is browsed by white-tailed deer and cottontail rabbits.

WOOD CHARACTERISTICS The wood is extremely hard and heavy. The sapwood is whitish brown and the heartwood, which is slightly darker, is tinged with red.

PRODUCTS Due to the tree's size, wood is not widely available. Eastern Hophornbeam is an excellent source of firewood and it is used, on a local basis, in furniture, handles, mallets and canes.

ADDITIONAL COMMENTS

AMERICAN SYCAMORE

(PLATANUS OCCIDENTALIS)

HEIGHT/SPREAD/DBH American Sycamore grows to a height and spread of 60 to 100' (18 - 30 m). Its diameter (DBH) at this height usually ranges between 2' and 8' (0.6 - 2.4 m), but much larger trunks have been observed.

FORM The tree has a spreading crown, crooked branches and a long, upright bole.

FOLIAGE The leaves, which emerge in late May, have 3 - 5 lobes. They grow 8 - 10" (20 - 25 cm) across and range in color from pale to bright green. The leaves turn brown in the Fall before dropping in late December.

FLOWER *Platanus occidentalis* is a monoecious species whose flowers are grouped in tight balls approximately 1" (2.5 cm) across. Male clusters, which are red, appear on the previous year's growth, and the greenish-red, female clusters appear on older growth. Sycamore flowers bloom between late March and May.

FRUIT The fruit is a multiple, or syncarp, composed of many tightly packed achenes. The light tan fruit has a hard outer coat and ripens from September to October. It persists through Winter and drops or breaks apart between February and May. Each achene has numerous hairs on one end that allow the seed to float on wind and water. They are also dispersed by several birds. The tree starts to produce fruit by 6 - 7 and reaches maximum production between 50 and 200.

RANGE The tree is a native of the eastern Great Plains from southeastern Nebraska to Texas where it grows into the south central portion of the state. American Sycamore is planted in USDA zones 4 - 9.

MOISTURE REQUIREMENTS During the growing season, *Platanus occidentalis* withstand as much as 2 weeks of continuous and complete inundation, but dies shortly thereafter if high waters persist. The tree grows best in moist soils with adequate groundwater and it resists drought.

GROWTH RATE/LIFESPAN *Platanus occidentalis* is a fast growing tree, even in old age. Young trees are especially fast, growing 36 - 48" (90 - 120 cm) their first year. The tree's lifespan is in excess of 350 years.

DISEASES/INSECTS American Sycamore's are attacked by many insects that may spoil the trees' appearance, but don't seriously injure healthy specimens. The most prominent insects are borers and beetles, but it's also attacked by lacebugs, moths, leaf rollers, leaf feeders and ants. The tree is subject to many diseases whose importance has increased with its use for biomass production. The most serious diseases are anthracnose, which is often misdiagnosed as frost damage, lethal bole cankers, leaf scorch and top dieback.

OTHER DAMAGING AGENTS The tree resists strong winds, but older trees often develop windshake, which reduces their commercial value. American Sycamores are susceptible to ice damage and late Spring frosts which kill many buds.

ROOT SYSTEM The root system is made up of shallow lateral roots that give mature trees a high degree of wind firmness and make young specimens easy to transplant.

HABITAT The tree is found in wet, lowland soils along streams and across the floodplain. It grows to an elevation of 3,200' (975 m).

SOIL REQUIREMENTS The tree grows in a wide variety of loamy and clay soils, ranging in texture from coarse to moderately fine. Its pH requirements range from 6.6 - 8.0.

SUN/SHADE Mature specimens have intermediate shade tolerance, but very young Sycamores require direct sunlight.

COMPETITIVENESS American Sycamores play a role in several successional stages. It is a pioneer on sand bars and gravel and replaces Willow and Cottonwood at water's edge.

WILDLIFE VALUE *Platanus occidentalis* have relatively little wildlife value. The fruits are eaten by muskrats and several birds, including mallards. Seedlings are browsed by white-tailed deer.

WOOD CHARACTERISTICS The wood is strong and moderately hard and heavy. It has a coarse grain with a high degree of shock resistance. Quarter-sawn lumber has a distinctive, ornamental figure.

PRODUCTS American Sycamore is used for quarter-sawn paneling, veneer, lumber, pallets, pulp and butcher blocks. One author suggests that quarter sawn stock is undervalued as an ornamental hardwood. The species is planted in short-rotation, biomass plantations across the southeast.

ADDITIONAL COMMENTS *Platanus occidentalis* have the largest diameter of any native North American tree. All aboveground portions of the tree are removed in 4 to 10 year biomass rotations and regenerate by coppicing.

NARROWLEAF COTTONWOOD

(*POPULUS ANGUSTIFOLIA*)

HEIGHT/SPREAD/DBH *Populus angustifolia* grows 50 - 60' (15 - 18 m) in height with a spread of 25 - 30' (7.5 - 15 m), or approximately one half its height. A fully grown plant has a diameter (DBH) of 1.5' (0.5 m).

FORM The tree has a narrow, upright crown and slender, ascending branches.

FOLIAGE Narrowleaf Cottonwood is named for its lance-shaped leaves which resemble willow. The upper surface of the thin leaf is bright yellow green and its underside is grayish.

FLOWER Reddish catkins loaded with flowers bloom in early Spring. The species is dioecious.

FRUIT Tiny, egg-shaped capsules mature in late Spring and split open, releasing many hairy seeds. The hairs allow the seed to be carried by the wind.

RANGE The tree is native to the western Great Plains from Montana to New Mexico and west Texas. It's also native to areas in the Blackhills and the Nebraska panhandle. Narrowleaf Cottonwood grows as far north as USDA zone 3.

MOISTURE REQUIREMENTS *Populus angustifolia* tolerates flooding, but grows best in moist, well-drained soils.

GROWTH RATE/LIFESPAN Narrowleaf Cottonwood is fast growing and has a short lifespan.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM The tree has a lateral root system which serves to provide excellent erosion control.

HABITAT Narrowleaf Cottonwood is found on moist, lowland sites between 3,000 and 8,000' (914 - 2438 m) in elevation.

SOIL REQUIREMENTS

SUN/SHADE The tree does not tolerate shade.

COMPETITIVENESS Narrowleaf Cottonwood competes with willows and alders along mountain streams.

WILDLIFE VALUE Cottonwood buds are eaten by more than ten bird species including sharp-tailed grouse, evening grosbeak and purple finch. Beavers, and several other animals, eat the bark, buds and foliage.

WOOD CHARACTERISTICS The lightweight wood is pale to light brown.

PRODUCTS The wood is used locally for firewood and fence posts. Cottonwood shoots have been used in basketry.

ADDITIONAL COMMENTS Young trees and seedlings are often mistaken for willows. *Populus angustifolia* hybridizes with Plains Cottonwood (*Populus sargentii*).

BALSAM POPLAR

(*POPULUS BALSAMIFERA*)

HEIGHT/SPREAD/DBH Balsam Cottonwood grows 60 -100' (18 - 30 m) with a diameter (DBH) of 1 - 3.5' (0.3 - 1.0 m).

FORM Young trees are pyramidal, but their crowns become rounded as they grow older.

FOLIAGE The leaves, which emerge after the flowers bloom, are dark and glossy, with pale undersides.

FLOWER *Populus balsamifera* is a dioecious species whose flowers bloom between April and July. Trees at lower elevations in the southern range bloom in April or May, but those farther north, and/or higher in elevation, bloom much later.

FRUIT Fruit production begins by age 10. The fruit capsule reaches maturity within a month of pollination and splits open, releasing many seeds over 2 - 3 weeks. Each seed is attached to a tuft of hairs that enable it to travel long distances on wind and water

RANGE *Populus balsamifera* is the northernmost American hardwood. It grows primarily on the Canadian Great Plains and is native to much of Manitoba and Saskatchewan. In America, it is native to widely scattered sites across the Dakotas, western Nebraska, Montana, Wyoming and Colorado.

MOISTURE REQUIREMENTS The tree is very flood tolerant and often grows in the floodplain. *Populus balsamifera* also tolerates drier soils on lower upland slopes. A study in northern Quebec found that male trees are more likely to grow on drier sites and female trees are more common along streams.

GROWTH RATE/LIFESPAN Balsam Poplar is a fast growing tree whose cotyledons expand within 18 - 24 hours of germination. Its maximum lifespan is around 200 years.

DISEASES/INSECTS The tree is attacked by a variety of borers which cause damage by tunneling or girdling the stem. The leaves are eaten by forest tent caterpillars and beetles. Fungi cause decay in older specimens and the species is subject to leaf rusts, leaf and twig blights and cankers.

OTHER DAMAGING AGENTS Individual trees and stands have varying susceptibility to fire, depending on their age and bark thickness. Balsam Poplars are girdled by rabbits and rodents, and beavers cut them down or flood them out.

ROOT SYSTEM The root system's initial growth is directed downward. Subsequent development is determined by site conditions. In dry soils, the root system develops laterally while continuing downward. A study found that the lateral roots of trees on dryland sites extended 26 - 39' (8 - 12 m). In moist or wet soils, the depth of the root system is restricted and lateral roots develop upward, as successive layers of flood-deposited silt initiate development of preformed root primordia.

HABITAT Balsam Poplar is found within the floodplain on sand and gravel bars and also lower upland slopes. It grows to an elevation of 5,500' (1,676 m).

SOIL REQUIREMENTS Flood plain Inceptisol soils, in which the species often grows, is a layered mixture of silt and organic soils. They also occur in Entisol soils.

SUN/SHADE The tree does not tolerate shade.

COMPETITIVENESS *Populus balsamifera* is invasive and highly competitive. It pioneers newly formed sand and gravel bars and succeeds Willow and Alder within the flood plain. The tree produces large crops of seeds that are dispersed over a large area, and their stumps and lateral root systems produce many suckers.

WILDLIFE VALUE Staminate buds are one of the ruffed grouses' favorite foods. They're also eaten by prairie chicken and several other birds. Moose, deer and elk chew the stems but not the leaves.

WOOD CHARACTERISTICS The sapwood and heartwood are light colored and difficult to distinguish. The soft wood is light weight.

PRODUCTS Balsam Poplar is grown in short-rotation biomass plantations and processed into pulp for books and magazines. The wood is used for construction, boxes, veneer, crates, core stock, and milled house logs. The bark is used for decorative carving.

ADDITIONAL COMMENTS The tree is named for the Spring fragrance of its resinous buds. Balsam Poplar crosses with several other species of Poplar. Hybrids are used for windbreaks, shelterbelts and biomass.

EASTERN COTTONWOOD

(POPULUS DELTOIDES)

HEIGHT/SPREAD/DBH *Populus deltoides* usually grow to a full height of 75 - 100' (22.5 - 30.0 m) with a spread of 50 - 75' (15.0 - 22.5 m). A specimen of this size has a diameter (DBH) of 3 - 4' (1.0 - 1.3 m) or larger. Much taller and larger specimens are found in the south.

FORM Eastern Cottonwoods are large trees with vase-like crowns and massive trunks.

FOLIAGE Light green, triangular leaves emerge in early May and darken to a glossy sheen before turning pale yellow in Fall. Eastern Cottonwood loses its leaves as early as September.

FLOWER Eastern Cottonwoods are dioecious. Reddish brown catkins bloom between February and April, before the leaves emerge. Male flowers range from 3 - 5" (8 - 13 cm) in length, and the female catkins are 6 - 12" (15 - 30 cm) in length. In general, male trees bloom before the females, and individual specimens bloom as much as a month earlier than nearby trees, inhibiting cross-pollination.

FRUIT Fruit development occurs rapidly, with seed dispersal beginning within two months of pollination. Each fruiting capsule contains 30 - 60 seeds that are released between May and mid July. Cottonwood trees produce their first crop between 5 and 10. As adults, they usually produce large crops. The seeds' germination rate is very high, but they must land on very moist soils or silt deposits to grow.

RANGE *Populus deltoides* is native to southeastern Manitoba in Canada. Its range extends south through the eastern Dakotas and the eastern and central portions of the states between there and Texas. Eastern Cottonwood grows in USDA zones 2 - 9.

MOISTURE REQUIREMENTS Eastern Cottonwoods grow best in moist stream side soils, but tolerate a very wide range of moisture conditions. It tolerates flooding while dormant, extended flooding during the growing season kills or damages many trees. Cottonwood also withstands drought and is planted on drier sites.

GROWTH RATE/LIFESPAN Eastern Cottonwood has the fastest growth rate of any North American commercial species. Growth rates of 4 - 5' (1.2 - 1.5 m) per year are recorded for ideal sites in the species' northern range. Much faster growth occurs in the South where they may reach 100' (30 m) by age 9. The tree reaches maturity between 60 and 75. Growth is greatly reduced thereafter, and the trees' maximum lifespan is 100 - 125 years.

DISEASES/INSECTS Cottonwood trees are the subjects of frequent attack by diseases and insects. Borers are the most serious cause of insect damage and cankers, from a variety of disease organisms, are common. Leaf rust and leaf spots also occur frequently.

OTHER DAMAGING AGENTS The trees are highly susceptible to fire at any age. Young Cottonwoods are severely damaged by low intensity fires which are less harmful to older specimens. They are more likely to be damaged by higher intensity fires. Beavers cut down saplings for dams. The dams cause flooding that kills nearby Cottonwoods.

ROOT SYSTEM Eastern Cottonwood has a phreatic root system that extends down into the water table. Each Spring, following the thaw, seeds dispersed along rivers and streams germinate in moist soils with water tables near the surface. The roots of these seedlings remain within the watertable as it slowly falls. Waterways used for irrigation have faster dropping levels and nearby seedlings have difficulty obtaining adequate moisture. The majority of a mature specimen's roots are shallow and fibrous, providing erosion control. As flooding deposits successive layers of silt, roots develop along newly buried portions of the stem.

HABITAT *Populus deltoides* are most common in wet, lowland areas, growing to an elevation of 5,000' (1,524 m).

SOIL REQUIREMENTS The tree grows in soils of all the soil texture categories, but prefers finely textured silts of the Entisol and Inceptisol orders. It resists compaction and requires a pH level between 6.5 and 7.5.

SUN/SHADE *Populus deltoides* do not tolerate shade.

COMPETITIVENESS Eastern Cottonwood is competitive and invasive, competing successfully with Willows along streams and dominating higher ground.

WILDLIFE VALUE Many animals, including deer, rabbits, beaver, squirrels and porcupine browse the leaves, stems and buds. Birds such as grouse and the evening and rose-breasted grosbeaks eat the buds. Woodpeckers drill into older trees to create nests.

WOOD CHARACTERISTICS The light colored wood is soft and light weight.

PRODUCTS Cottonwood lumber is used for crates, pallets, furniture corestock and containers. It has high potential for biomass due to its rates of growth and regeneration

ADDITIONAL COMMENTS Male cultivars are sometimes used in windbreaks. Cottonwoods grown in plantations must be spaced and thinned carefully to maintain their growth rate.

FREMONT COTTONWOOD

(POPULUS FREMONTII)

HEIGHT/SPREAD/DBH Fremont Cottonwood reaches a full height of 50 to 100' (15 - 30 m). A fully grown specimen's diameter (DBH) ranges from 2 - 4' (0.6 - 1.2 m).

FORM *Populus fremontii* has the characteristic, vase-like crown of its genus, but its trunk is shorter than other Cottonwoods.

FOLIAGE The light yellow-green leaves turn bright yellow in the Fall.

FLOWER Like all Cottonwoods, *Populus fremontii* is dioecious with reddish catkins that bloom in early Spring. Their sex is easily distinguished by the floral arrangements. Male catkins have many flowers packed together tightly, while each female catkin contains only a few flowers.

FRUIT The fruits are tiny, egg-shaped capsules that open in late Spring, releasing numerous seeds. Each has fine hairs that allow it to float or carry on the wind.

RANGE Within the Great Plains, Fremont Cottonwood is native to eastern New Mexico and the farthest western corner of Texas.

MOISTURE REQUIREMENTS Fremont Cottonwood tolerates flooding and only grows on moist to wet soils.

GROWTH RATE/LIFESPAN Due to its fast growth, Fremont Cottonwood has a short lifespan.

DISEASES/INSECTS

OTHER DAMAGING AGENTS Parasitic mistletoes are often found on Fremont Cottonwood.

ROOT SYSTEM Due to their phreatic root system, *Populus fremontii* indicates a permanent supply of water.

HABITAT The tree is found in wet to moist soils along rivers and streams. Its elevation range extends from 150' (45 m) to 6,000' (1,800 m).

SOIL REQUIREMENTS

SUN/SHADE

COMPETITIVENESS

WILDLIFE VALUE The bark is chewed by horses and by beaver which use the branches to build dams. Deer and livestock also browse the plant.

WOOD CHARACTERISTICS This brittle, light weight wood has little commercial value. Its color ranges from whitish to light brown.

PRODUCTS Firewood and posts are the primary products from the tree. Its roots have long been used for carving.

ADDITIONAL COMMENTS Fremont Cottonwoods are often planted for shade.

PLAINS COTTONWOOD

(*POPULUS SARGENTII, DODE*)
(*POPULUS DELTOIDES V. OCCIDENTALIS, RYDB.*)

HEIGHT/SPREAD/DBH Plains Cottonwood grows to a full height of 80 - 90' (24.4 - 27.4 m).

FORM The tree has a single, short trunk and very broad crown.

FOLIAGE The triangular foliage is shiny light green.

FLOWER Plains Cottonwood is a dioecious species whose short catkins bloom in April and May on one year old growth.

FRUIT Fruit development takes four to six weeks, and seed distribution lasts for up to six weeks thereafter, because of widely varying bloom periods. Fruit production begins as early as age 10 with large crops most years.

RANGE The plant's range, which covers most of the upper three quarters of the Great Plains, extends down to north central Texas.

MOISTURE REQUIREMENTS The tree's moisture limits extend from poorly drained soils in the flood plain to well-drained soils.

GROWTH RATE/LIFESPAN Like other members of its genus, Plains Cottonwood is fast-growing with a short lifespan. The tree, which grows 6 - 12' (1.8 - 3.7 m) per year, records its fastest growth during its first 25 - 30 years, reaching 50 - 75' (15.2 - 22.9 m). It matures between the ages of 40 - 50 and usually stays in good health until 80 - 90.

DISEASES/INSECTS *Melampsora* leaf rust is one of the most serious diseases affecting Plains Cottonwood. Leaf spots, blights and stem blights are associated diseases that reduce the vigor of the tree and attract invasive pathogens. A wide array of canker pathogens afflicts Plains Cottonwood. The most prominent is *Cytospora* canker which greatly weakens the structure of the tree, allowing wind damage to occur. Insect pests fall into two broad categories: defoliators and wood borers. Defoliators cause the tree's health to decline. They include webworms, canker worms, leaf beetles and the forest tent caterpillar. Wood borers' tunnels reduce the economic value of trees. A broad array of borers afflicts Plains Cottonwood.

OTHER DAMAGING AGENTS Plains Cottonwood is highly susceptible to drought due to its constant need for moisture.

ROOT SYSTEM The roots of newly germinated seedlings grow slowly their first month, but much faster, thereafter. Most mature specimens are located within the flood plain and have shallow, fibrous root systems. When the water is deeper, the tree grows a taproot. Once it reaches the water table, laterals extend from the taproot.

HABITAT Plains Cottonwood is relegated to moist or wet lowlands between the elevations of 1,000 & 6,000' (300 - 1,830 m).

SOIL REQUIREMENTS The plant achieves its best growth in deep loamy soils and often grows on sandbars in pure stands. Plains Cottonwood grows in Entisol, Mollisol, Alfisol and Inceptisol soils.

SUN/SHADE Plains Cottonwood does not tolerate shade.

COMPETITIVENESS The tree cannot tolerate root competition and pure stands thin rapidly. Plains Cottonwood is a pioneer that is replaced by other species which grow in its shade.

WILDLIFE VALUE Deer and rabbits browse the tree. Birds, such as grouse, feed on its buds.

WOOD CHARACTERISTICS The pale wood is strong, despite its light weight and softness. Cottonwood lumber tends to warp, and it deteriorates quickly from contact with the soil.

PRODUCTS The lumber is used for construction and general uses like crates, posts and firewood. Like other members of its genus, it has high potential for short-term biomass production (2- 8 years). However, the tree's inability to tolerate root competition reduces its long term regenerative capacity in plantations.

ADDITIONAL COMMENTS Plains Cottonwood hybridizes freely with many other members of the *Populus* genus and is used in windbreaks and for shade and ornament.

QUAKING ASPEN

(*POPULUS TREMULOIDES*)

HEIGHT/SPREAD/DBH *Populus tremuloides* reaches 66 - 82' (20 - 25 m), and has a spread of 45 - 65' (13.5 - 20 m) or approximately 1/3 - 2/3 of the height. Mature specimens have a diameter (DBH) of 1 - 1.5' (0.3 - 0.5 m).

FORM Quaking Aspens are tall, narrow trees with long trunks.

FOLIAGE Light green leaves emerge in mid April. Their topsides mature to a bright green, while the undersides remain pale. In Autumn, leaf color ranges from golden orange to bright yellow. Quaking Aspen is named for its rustling leaves which move in the lightest breeze.

FLOWER Silvery-gray catkins bloom between May and June. Quaking Aspen is dioecious, but 10 - 20% of the female trees and 5% of the males produce some perfect flowers.

FRUIT Pollinated female catkins mature quickly. The fruiting capsules open in 4 - 6 weeks, releasing a small number of brown seeds. Each seed has a tuft of silky hairs which enable it to travel for miles via wind and water. Seed production begins as early as age 5. Large crops, which are first produced between 10 and 20, continue as late as the age of 70.

RANGE The species is North America's most widely distributed tree. Within the Great Plains, its native range stretches from Manitoba and Saskatchewan to scattered sites across the Dakotas, Montana, Wyoming, Colorado, western Nebraska and New Mexico. Quaking Aspen grows in USDA zones 1 - 6.

MOISTURE REQUIREMENTS *Populus tremuloides* have intermediate moisture requirements. It will not tolerate flooding, but grows in wet soils. It also has moderate drought resistance. Aspens' best growth occurs in moist, well-drained soils. The depth of the soil's water table is a critical factor. The water level must be below 2' (0.6 m), but no deeper than 8' (2.5 m).

GROWTH RATE/LIFESPAN Quaking Aspen is a fast growing species, especially before the age of 20. Its maximum lifespan is between 150 & 200 years.

DISEASES/INSECTS The trees are attacked by an extremely wide variety of insects and diseases. Insect pests fall into three categories: 1) defoliators, including caterpillars, leaf-rolling sawflies, moths, leaf miners and defoliating beetles; 2) borers, most of which are beetles; and 3) sucking insects, which are primarily aphids and leafhoppers. Most of the damage is done by a relative few of the hundreds of species attacking the tree. Aspens' list of diseases includes leaf spot, shoot blight, leaf rust fungus, powdery mildew, trunk rot fungus, butt and root rot fungus and numerous cankers. Viruses have been discovered in a few clones around the country, but the extent of their threat is unknown at this time.

OTHER DAMAGING AGENTS Quaking Aspens are frequently damaged or killed by large animals which favor them as rubbing posts, and smaller animals which girdle their stems. They are highly susceptible to fire, frost, freeze, strong winds and hail.

ROOT SYSTEM The root system's configuration depends on the depth of the soil. In deep soil, with adequate drainage, a seedling's initial tap root evolves into a heart root system. In these soils, clonal ramets, which start with flat roots, also develop heart root systems. Whenever soil depth is limited, Aspens have a flat root system. *Populus tremuloides* spread by root suckers. Mature trees have very extensive lateral roots that produce a multitude of shoots, forming a single, vast clone. In addition to lateral and feeder roots, sinker roots extending from the laterals grow deep into the soil.

HABITAT The tree is found primarily in moist uplands. Its elevational requirements vary tremendously, depending on continental position.

SOIL REQUIREMENTS The tree grows in many types of soil, with textures ranging from coarse to fine. Its native soils fall within the Alfisol, Spodosol, Inceptisol and Histosol orders. Quaking Aspens are sensitive to compaction and their pH requirements range from 4.8 - 6.5. They do not grow well in dry, sandy soil because of excessive drainage and low CEC values.

SUN/SHADE Quaking Aspen does not tolerate shade.

COMPETITIVENESS *Populus deltoides* are an aggressive competitor which invades exposed sites. It is succeeded by more shade tolerant conifers.

WILDLIFE VALUE Many animals depend on Quaking Aspen for food and cover. The species is heavily browsed by deer, elk and moose and they are an important food source to beavers and smaller animals. Birds such as ruffed grouse and quail eat their seed and buds and use them for nesting cover and breeding.

WOOD CHARACTERISTICS Aspen wood is light brown to creamy white. It is fairly light wood, with a straight grain and distinctive odor when wet.

PRODUCTS The wood is used to make crates, pallets, furniture corestock, boxes, pulp, excelsior and particle board. It is also used as biomass and processed into animal feed.

ADDITIONAL COMMENTS The tree hybridizes with a number of other *Populus* species. Aspens have high nutritional demands and improve the efficiency of nutrient cycling in the riparian zone.

SCREWBEAN MESQUITE

(*PROSOPIS PUBESCENS*)

HEIGHT/SPREAD/DBH Screwbean Mesquite grows to a height of 20 - 30' (6 - 9 m) with a diameter (DBH) of 8 - 12" (20 - 30 cm).

FORM The plant is grown as a small tree or large shrub. It has spiny, irregular branches and distinctively coiled pods.

FOLIAGE *Prosopsis pubescens* have bipinnately compound foliage, with 5 - 8 pairs of leaflets.

FLOWER Narrow spikes, with densely clustered, light yellow flowers, bloom between May and August.

FRUIT The fruit is a tightly coiled, indehiscent pod which turns brown and become woody as it reaches maturity in late Summer. In Autumn, the short pods drop from the tree.

RANGE *Prosopsis pubescens*' native range extends along the Rio Grande River from southern Texas to central New Mexico.

MOISTURE REQUIREMENTS Screwbean Mesquite tolerates flooding and grows best in wet to moist soils. It also withstands drought and grows in dry, desert soils.

GROWTH RATE/LIFESPAN

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT The plants form dense thickets along the flood plains and washes of streams and rivers. It also grows farther out in the desert. Screwbean Mesquite grows from sea level to 5,500' (1650 m) in elevation.

SOIL REQUIREMENTS The plant grows in a variety of desert soils, including sand, rock and gravel.

SUN/SHADE

COMPETITIVENESS The plant often forms dense thickets which provide erosion control.

WILDLIFE VALUE The plant is browsed by deer, rabbits, rats and cattle. Birds such as Gambel's quail, roadrunners and bobwhite eat the seed.

WOOD CHARACTERISTICS The wood is heavy, tough and durable.

PRODUCTS Wood products include fence posts, tool handles and firewood. The immature pods are edible and have a sweet-tasting pulp. They are eaten raw or made into cakes, meal, and syrup.

ADDITIONAL COMMENTS The plant is also known by its Spanish name, "tornillo" which means a screw.

BLACK CHERRY

(*PRUNUS SEROTINA*)

HEIGHT/SPREAD/DBH *Prunus serotina* grows as large as 80' (24 m), but commonly grows 30 to 50' (9 - 15 m). Its spread is approximately one half of the tree's height.

FORM Black Cherry's crown varies from narrow and oblong to broad and rounded. Its lower branches are pendulous, hanging low to the ground.

FOLIAGE Glossy leaves emerge in mid May and retain their sheen through Summer. In Autumn, they turn yellow or reddish, before falling in mid October.

FLOWER Fragrant, white, solitary flowers, arranged in 4 - 6" (10 - 15 cm) racemes, bloom between the end of March and June. They are pollinated by bees, flies and a species of a flower beetle. The flowers are often damaged before opening by late Spring frosts.

FRUIT Slightly bitter, dark red or black drupes reach maturity between the end of June and late September. The trees begin fruit production by age 10, with peak production between 30 and 100. Large crops are borne every one to five years. Production extends as late as age 180.

RANGE The tree has a very broad native range, covering most of the eastern United States. Within the Great Plains, it is limited to an area extending from southeastern Nebraska through eastern Kansas, Oklahoma and Texas, including a portion of central Texas. The tree is planted in USDA zones 3 - 9.

MOISTURE REQUIREMENTS *Prunus serotina* does not tolerate flooding. It grows best in moist, well-drained soils, but tolerates drier soils and drought.

GROWTH RATE/LIFESPAN The species has a very fast growth rate, especially through its pole stage of development. Their maximum life expectancy exceeds 180 years, but chances of survival drop quickly after the age of 100.

DISEASES/INSECTS Black Cherry is subject to infrequent, but potentially serious, disease and insect damage. Defoliating insects reduce the trees' growth and occasionally kill them. Gum defects, which are caused by a number of species, reduce their lumber quality. Insects also cause stem deformities by damaging shoot terminals. A cherry leaf spot is the most common disease afflicting the tree. Its greatest threat is to young trees but it weakens larger specimens. Black knot, leaf spots and root and butt rots also damage the trees.

OTHER DAMAGING AGENTS Heavy damage occurs when small animals chew on the bark, creating entry points for fungus or completely girdling the trees. Browsers, such as deer and rabbits may destroy entire seedling populations. The species is highly susceptible to fire at any age.

ROOT SYSTEM Most of the root system is in the top 2' (0.6 m) of the soil, with sinker roots extending 3 - 4' (1.0 - 1.3 m) deep. The species' trend toward shallow roots is especially pronounced on wetter sites. This characteristic, along with faster growth than associated species, makes Black Cherries, especially older specimens, vulnerable to wind throw.

HABITAT The tree grows in moist upland soils, to an elevation of 7,500' (225 m).

SOIL REQUIREMENTS The roots are sensitive to compacted soils and require a pH level of 6.1 - 7.5. Black Cherry trees grow in moderately coarse to moderately fine, sandy and silty loams, many of which have fragipans. These soils belong to the Alfisol, Inceptisol, Ultisol orders.

SUN/SHADE *Prunus serotina* does not tolerate shade.

COMPETITIVENESS The tree's shade intolerance limits its competitiveness. Many young seedlings germinate beneath or near the parent, only to be shaded out. Larger trees must dominate or be codominant, or they will be shaded out by slower-growing, shade tolerant species. Certain herbaceous plants have allelopathic affects on the establishment and regeneration of Black Cherries.

WILDLIFE VALUE The fruits are eaten by more than 47 birds including ruffed grouse, sharp-tailed grouse, ring-necked pheasants and redheaded woodpeckers. They are also eaten by deer, bears, squirrels, mice and other small animals. In Autumn, the wilting leaves, which are browsed by deer and cattle, contain cyanide, which may reach toxic levels. Animals which eat them at this time may become sick or die, though they are eaten earlier without harm.

WOOD CHARACTERISTICS Black Cherry wood is fairly hard and heavy, with a close-grain and an attractive, finished luster. The sapwood is whitish to reddish brown and its heartwood is darker.

PRODUCTS The wood is used extensively in furniture and veneers, patterns, scientific and professional instruments, piano actions, interior trim and plywood. The bark contains hydrocyanic acid and was used to make cough syrup, tonics and sedatives. The fruits are made into wine and jellies.

ADDITIONAL COMMENTS

WHITE OAK

(*QUERCUS ALBA*)

HEIGHT/SPREAD/DBH White Oak grows to a full height of 80 - 100' (24 - 30 m) with a spread greater than or equal to its height. A fully grown specimen has a diameter (DBH) of 3 - 4' (1.0 - 1.3 m).

FORM *Quercus alba* is a large tree, with a broadly spreading crown.

FOLIAGE The leaves are tinged with red and pink as they emerge between late March and late May. They darken to a bluish green, and their Fall color varies from purplish red to violet. The leaves persist through midwinter.

FLOWERS White Oak is a monoecious species with inconspicuous flowers which bloom as its leaves emerge. The male flowers are yellowish catkins which appear first and are followed, several days later, by solitary or paired female flowers. A large percentage of the female flowers are not pollinated.

FRUIT The fruits are large acorns which turn light brown as they reach maturity between late July and early October. They start dropping 3 - 4 weeks later, and the entire crop falls within a month. The trees begin producing around the age of 20, and their maximum nut-bearing years are between 50 and 200, with large crops borne every 4 - 10 years. An average crop consists of approximately 10,000 acorns.

RANGE The tree is native to the eastern fringe of the Great Plains from Kansas to Texas. It is planted in USDA zones 3 - 9.

MOISTURE REQUIREMENTS *Quercus alba* has intermediate moisture requirements. It is sensitive to flooding and does not grow in poorly drained soil. The tree grows best in well-drained soils and has intermediate drought resistance.

GROWTH RATE/LIFESPAN The tree is a slow grower but given the right conditions, it grows much faster. White Oaks have a lifespan of 400 - 600 years.

DISEASES/INSECTS A long list of insects, including leaf eaters, scale, gall-forming insects, twig pruners, weevils and moths, attack the tree. Alone, most species do not cause serious damage, but successive attacks may weaken or kill healthy trees. White Oaks are less susceptible to oak wilt than Red Oaks, however, the disease is still the most serious threat to their health. Other diseases afflicting White Oaks include: cankers, rot, fungi, oak leaf blister, anthracnose, leaf spots, powdery mildew, rust, blight, and wood decay.

OTHER DAMAGING AGENTS Fire poses a potential threat to White Oaks, but they are not as sensitive as other oak species.

ROOT SYSTEM Seedlings develop a deep taproot which is eventually replaced by a system of tapered laterals. A mature specimen also has many feeder roots near the surface

HABITAT White Oak is found on upland slopes with mesic to dry soils. In the central and southern Great Plains, it grows to 4,500' (1,370 m) in elevation, but in the north, it doesn't grow above 500' (150 m).

SOIL REQUIREMENTS *Quercus alba* requires deep soil and it is highly sensitive to compaction. Their growth is not limited by insufficient soil nutrients, except in dry sand. They require a pH level between 6.1 and 7.5 and grow in soil textures ranging from coarse, sandy loams, to fine, heavy clays. Their native soils are part of the Alfisol and Ultisol orders.

SUN/SHADE White Oak has intermediate shade tolerance. Young trees are much more tolerant, however, and survive under the forest canopy as late as age 90. Thereafter, they slowly lose their shade tolerance.

COMPETITIVENESS Young specimens respond quickly to release. Eventually, they attain dominance due to their extended lifespan.

WILDLIFE VALUE Many birds and animals use the species for food and cover. Birds which eat the tree's acorns include blue jays, redheaded woodpeckers, ring-necked pheasants, ruffed grouse and wild turkey. White Oak acorns are also an important part of the diet of red squirrels. Deer and rabbits browse the tree.

WOOD CHARACTERISTICS *Quercus alba* is the most important source of lumber from the White Oak species whose woods are indistinguishable and marketed collectively as "White Oak." White Oak wood is very hard and heavy with a straight grain. Its color ranges from the whitish sapwood to its dark brown heartwood.

PRODUCTS Many furniture products are made from White Oak, including tables, flooring, cabinetry and paneling. It is also used for poles, pilings, railroad ties, crates, pallets and whiskey barrels.

ADDITIONAL COMMENTS

SOUTHERN RED OAK

(*QUERCUS FALCATA V. FALCATA*)

HEIGHT/SPREAD/DBH Southern Red Oak reaches a height of 70 - 80' (20 - 25 m) and has a diameter (DBH) of 2 - 3' (0.6 - 1.0 m).

FORM The tree has a tall trunk and a high rounded crown.

FOLIAGE The topside of the leaf is glossy green, but its underside is dull colored with reddish to grayish hairs.

FLOWER *Quercus* is a monoecious genus. The inconspicuous flowers of Southern Red Oak appear in April or May. The staminate flowers are arranged in catkins, while the female flowers are solitary or in catkins of several to many flowers.

FRUIT The acorns, which are small, ripen in September and October, a year and a half after pollination. The tree begins to produce fruit by age 25, and its maximum fruit-bearing years are between 50 and 75.

RANGE Within the Great Plains, the species' native range is restricted to eastern Texas and the southern and central portions of east Oklahoma. It is planted in USDA zones 7 - 9.

MOISTURE REQUIREMENTS The tree's moisture requirements fall into the intermediate range. It grows best in moist soils which are moderately well to well-drained. It also grows in drier soils, but drought weakens the tree's health.

GROWTH RATE/LIFESPAN Southern Red Oak grows at a moderately fast rate and its lifespan averages 150 years.

DISEASES/INSECTS Fire scars allow cankers and rot fungi to enter the trees. Other diseases which affect them include leaf blister, leaf spots and oak wilt, which usually does not occur below the 35th parallel. Insects that damage the trees include the hickory spiral borer, the oak stem borer, acorn weevils and several defoliators.

OTHER DAMAGING AGENTS The thin bark of the trees make them susceptible to fire damage.

ROOT SYSTEM

HABITAT The tree grows to an elevation of 2,000' (610 m) and is found in lowlands as well as upland areas.

SOIL REQUIREMENTS The tree is found in a broad variety of loamy soils of the Ultisol and Alfisol orders.

SUN/SHADE Southern Red Oak has intermediate shade tolerance, which is less than its associated species.

COMPETITIVENESS Dense stands of Southern Red Oak produce the best lumber, because release causes epicormic branching to occur, reducing the commercial value of the wood.

WILDLIFE VALUE The acorns are eaten by bobwhite, red-headed woodpeckers, common grackles, squirrels, quail and turkey. The tree is browsed by deer.

WOOD CHARACTERISTICS While the light red wood is hard and strong, it tends to crack after prolonged exposure to the sun and contact with the soil causes rotting.

PRODUCTS Southern Red Oak lumber is used for general construction purposes and crates, pallets and firewood.

ADDITIONAL COMMENTS The tree is often used for ornament and shade.

CHERRYBARK OAK

(QUERCUS FALCATA V. PAGODAFOLIA)

HEIGHT/SPREAD/DBH Cherrybark Oak grows to a height of 100 to 130' (30.5 - 39.6 m) with a diameter (DBH) of 3 - 5' (1.0 - 1.6 m).

FORM Cherrybark Oak is closely related to Southern Red Oak (*Q. falcata v. falcata*) but is a taller tree and has a longer bole.

FOLIAGE The leaves of the tree are almost identical to Southern Red Oak, but they are more regularly lobed.

FLOWER *Quercus* is a monoecious genus. Cherrybark Oak's inconspicuous flowers bloom between February and May. Its staminate flowers are arranged in catkins while the female flowers are solitary or arranged in catkins.

FRUIT The tree's small acorns reach maturity between August and November, a year after pollination occurs.

RANGE The species' native range includes southeastern Oklahoma and eastern Texas. It is planted in USDA zones 7 - 9.

MOISTURE REQUIREMENTS The tree does not tolerate flooding and usually doesn't grow in wet soils. Cherrybark Oak grows best in moist, well-drained soils.

GROWTH RATE/LIFESPAN Cherrybark Oak is one of the faster-growing oak species.

DISEASES/INSECTS The tree is attacked by wood borers, twig galls and defoliators. Its acorns are damaged by weevils and filbert worms. Diseases that attack the trees include cankers, rot fungi, leaf blister, oak wilt and heart rot. The most serious damage occurs to trees growing in wet soils and other poor sites.

OTHER DAMAGING AGENTS The most frequent causes of damage are fire and hurricane-force winds which weaken the tree by creating entry points for insects.

ROOT SYSTEM The tree has a taproot which dies back and is replaced by sinker roots which descend from the lateral root system.

HABITAT Cherrybark Oak is found on upland sites but it is more common in lowlands. It grows in moister soil than Southern Red Oak.

SOIL REQUIREMENTS The tree requires slightly acid to acid soils belonging to the Alfisol or Inceptisol orders.

SUN/SHADE The tree does not tolerate shade.

COMPETITIVENESS Cherrybark Oak's root system leaves it susceptible to windthrow.

WILDLIFE VALUE The acorns are eaten by wild turkey, bluejays, wood ducks, red-bellied and redheaded woodpeckers, grackles and nuthatches. Animals that eat the fruit include gray and fox squirrels and raccoons. The tree is browsed by white-tailed deer.

WOOD CHARACTERISTICS Cherrybark Oak is a valued red oak timber species. Its bole is long and straight with few branches like other oaks. The wood is harder and heavier than Southern Red Oak and doesn't crack from exposure.

PRODUCTS The wood is widely used for furniture quality uses and for firewood.

ADDITIONAL COMMENTS

SHINGLE OAK

(*QUERCUS IMBRICARIA*)

HEIGHT/SPREAD/DBH The tree's mature height and spread are 50 - 60' (15 - 18 m) and its diameter (DBH) is 1 - 2' (0.3 - 0.6 m).

FORM Young specimens have a conical form, but the mature tree's crown is rounded with drooping lower branches.

FOLIAGE The glossy leaves of *Quercus imbricaria* do not resemble other Oaks and are distinguished by their unlobed margins. Their light yellow-green color darkens as the season progresses and in Autumn, ranges from golden yellow brown to dark red.

FLOWER Shingle Oak is a monoecious species whose flowers bloom between mid and late May, soon after the leaves emerge. The male flowers are arranged in short catkins, while the pistillate flowers are in catkins or groups of several flowers.

FRUIT Small, dark acorns mature in September, more than a year after pollination.

RANGE Within the Great Plains, Shingle Oak is native to portions of eastern Kansas and Nebraska. It is planted in USDA zones 4 - 8.

MOISTURE REQUIREMENTS The tree's moisture tolerance is fairly broad. It has intermediate tolerance to flooding and also grows in dry soils and resists drought.

GROWTH RATE/LIFESPAN Shingle Oak's slow growth is typical of an Oak. Its life span extends up to 250 years.

DISEASES/INSECTS The tree is attacked on a less frequent basis by many of the diseases and insects that effect White Oak. This includes oak wilt, anthracnose, cankers, lacebug, mites and oak skeletonizers.

OTHER DAMAGING AGENTS

ROOT SYSTEM Shingle Oak's taproot system is not as deep as other Oak species and they are not as difficult to transplant.

HABITAT The tree grows from moist lowlands to dry upland areas to an elevation of 2,000' (610 m).

SOIL REQUIREMENTS *Quercus imbricaria* prefers acid pH soils ranging from 4.5 - 6.0. It has intermediate resistance to compaction and grows in moderately coarse loams to moderately fine-textured, clay loam.

SUN/SHADE Shingle Oak does not tolerate shade.

COMPETITIVENESS The tree's intolerance to shade prevents it from becoming dominant in mixed stands.

WILDLIFE VALUE The acorns are eaten by turkey, quail, ducks and other waterfowl. They are also eaten by squirrels. Deer browse the tree.

WOOD CHARACTERISTICS The species is part of the Red Oak group. Its wood is indistinguishable from other members of the group.

PRODUCTS The wood is sometimes marketed as Red Oak, but is little used commercially.

ADDITIONAL COMMENTS The common and Latin names refer to the tree's former wide use for wooden shingles. Shingle Oak is an ornamental species used in windbreaks, hedges, screens and as a shade tree.

BUR OAK

(*QUERCUS MACROCARPA*)

HEIGHT/SPREAD/DBH Bur Oak is a large tree that grows to a height of 80 - 100' (24 - 30 m) with a spread of equal proportion. The diameter (DBH) of a mature specimen is 3 - 4' (1.0 - 1.3 m).

FORM The tree has a stout trunk and broad spreading branches which form an open crown.

FOLIAGE The leaves, which emerge in early May, turn dark green with silvery, gray undersides. They are distinguished by a pair of deep lobes and, in Fall, turn yellow-brown before dropping in November.

FLOWER Bur Oak is a monoecious species whose flowers appear between early April and mid June, shortly after leaf emergence. Flowers of both sexes are arranged in catkins on the current year's growth. The pollen has a higher rate of germination on the flowers of other Bur Oaks, improving cross-fertilization.

FRUIT *Quercus macrocarpa*'s acorns are the largest of all the Oak species and reach maturity in a single season, between August and November. Their deep, fringed cup covers more than half the nut and gives the tree its common name. Bur Oaks begin producing seed around the age of 35, with peak production between 75 and 150. They continue to produce seed beyond age 400, with large crops every 2 - 3 years.

RANGE The tree is widely distributed across the eastern and central Great Plains from Canada to the Gulf Coast of Texas and grows in USDA zones 2 - 8.

MOISTURE REQUIREMENTS Bur Oak is relatively intolerant of flooding. It withstands short periods of flooding, but survival rates drop quickly if flooding is prolonged. The tree is one of the most drought resistant Oak species.

GROWTH RATE/LIFESPAN The tree grows slowly and lives more than 400 years.

DISEASES/INSECTS The species' most serious insect problems come from a group of defoliators, the worst of which is the oak lacebug which frequently attacks shelterbelt trees, especially during drought. Oak wilt is the most serious disease facing Bur Oaks, but it's less of a threat to them than other Red Oak species. Other disease problems are cankers and cotton root rot.

OTHER DAMAGING AGENTS The tree's thick bark protects it from fire.

ROOT SYSTEM The tap root of young trees grows quickly, producing an extensive lateral system. The mass and volume of older root systems are nearly equal with the aboveground portions of the plants and their spreads can double the size of the crowns.

HABITAT Bur Oak commonly grows along the edge of the floodplain as well as in moist to dry upland soils to an elevation of 3,000' (914 m).

SOIL REQUIREMENTS *Quercus macrocarpa* grows in all soil textures, but most commonly in loams and heavy clays of the Alfisol, Mollisol and Spodosol orders. It has a broad pH range extending from 4.6 - 8.0 and is sensitive to compacted soil.

SUN/SHADE The tree has intermediate tolerance to shade.

COMPETITIVENESS The species is a pioneer on dry, upland soils where it competes successfully with grasses and shrubs due to its fast-growing root system and highly efficient use of water.

WILDLIFE VALUE Many birds and animals eat the acorns, including red squirrels, white-tailed deer and cottontail rabbits. The acorns are favored by wood ducks.

WOOD CHARACTERISTICS The wood, which is marketed as White Oak, ranges in color from light to dark brown. It is a very hard, strong and highly durable wood.

PRODUCTS The lumber has many furniture and construction quality uses. It is used in furniture, cabinetry, veneer, paneling, flooring and boat decking. It is also used to make crates, pallets, fence posts, pilings and railroad ties. Bur Oak is a high quality firewood.

ADDITIONAL COMMENTS Bur Oak is an ornamental shade tree used in shelterbelt plantings.

PIN OAK

(QUERCUS PALUSTRIS)

HEIGHT/SPREAD/DBH Pin Oak trees reach a full height of 80 - 90' (24 - 27 m) with a spread of 30 - 50' (9 - 15 m). The diameter (DBH) of a fully grown specimen is 2' (0.6 m).

FORM The tree has a tall, narrow crown. Its upper branches are ascendent, the middle branches extend horizontally and its lower branches bend downward. The tree has a short bole.

FOLIAGE The leaves emerge in early May and are identified by their deep lobes which cut nearly to the midrib. The glossy green leaves, which turn bronze to golden red in the Fall, persist through February.

FLOWER Pin Oaks are a monoecious species. Their flowers appear in early to mid-May as the leaves emerge. The staminate flowers are arranged in axillary catkins on the previous year's growth, while the pistillate flowers, which are also axillary, but on current growth, are solitary or in groups of 2 - 4.

FRUIT The fruit is a reddish-brown acorn with black striations and small cap. They reach maturity their second season and are dispersed between September and early December. Pin Oaks start producing fruit around the age of 20, with large crops most years.

RANGE Pin Oak is native to eastern Kansas and Oklahoma and grows in USDA zones 4 - 8.

MOISTURE REQUIREMENTS The tree grows best in wet soils with poor drainage and moist, well-drained soil. It is highly tolerant of flooding during the off-season and often grows in areas subject to dormant season flooding. Pin Oaks have less flood tolerance during the growing season and their overall tolerance is classified as intermediate. They are capable of withstanding an entire growing season of continuous flooding, but may be injured or die if floods resume in the Spring. The trees are also resistant to drought.

GROWTH RATE/LIFESPAN *Quercus palustris* is a fast-growing species which reaches maturity within 125 - 175 years.

DISEASES/INSECTS The species is highly susceptible to many of the diseases and insects that affect Oaks. It is most susceptible to leaf blister fungus, shoot blight, twig canker fungus and pin oak blight diseases. The tree is one of the gypsy moth's favorites and it is attacked by borers, gall wasps, scale, sawflies and forest tent caterpillars.

OTHER DAMAGING AGENTS Due to its thin bark, the tree is easily damaged by fire, creating entry points for diseases and insects. In alkaline soils, Pin Oaks develop leaf chlorosis due to foliar deficiencies of manganese, iron or zinc along with excess concentrations of phosphorous, potassium or magnesium. This is easily corrected by applying sulfuric acid to the soil.

ROOT SYSTEM In well-drained soils with adequate aeration, the tree develops a taproot which gives way to a fibrous root system.

HABITAT Pin Oaks grow best in wet to moist lowland areas less than 1,000' (305 m) in elevation.

SOIL REQUIREMENTS The tree resists compaction and grows best in hard clay Entisol soils. It requires a pH level between 5.5 and 6.5.

SUN/SHADE Pin Oak does not tolerate shade.

COMPETITIVENESS The trees respond quickly to release. Pin Oaks grow much more quickly on bottomland sites.

WILDLIFE VALUE The acorns are eaten by white-tailed deer, squirrels, mice and other rodents. They are also eaten by turkeys, woodpeckers, blue jays, mallards and wood ducks.

WOOD CHARACTERISTICS Pin Oak lumber is marketed as low-grade Red Oak because of the "pin knots" caused by small branches which remain on the tree after they've been shaded out. The wood is whitish to light reddish-brown. It is very heavy, quite hard and coarse grained, but lacks the strength of Red Oak.

PRODUCTS The wood is used for construction quality purposes, but must be treated with preservatives before coming in contacting with the soil. The lumber is used for fence posts, railroad ties, pilings and mine timbers. It is also used to make crates, pallets, boxes and furniture frames. Pin Oak is a high quality firewood.

ADDITIONAL COMMENTS The tree is widely used for shade and ornament.

RED OAK

(*QUERCUS RUBRA*)

HEIGHT/SPREAD/DBH Red Oaks grow 65 - 100' (20 - 30 m) with equivalent spreads. Their diameters (DBH's) range from 2 - 3' (0.6 - 1.0 m).

FORM The trees have rounded crowns starting from a young age.

FOLIAGE Red Oaks' leaves emerge in May and turn glossy dark green over Summer. The species is often planted for its dark red Fall color.

FLOWER Monoecious flowers bloom in April or May. The staminate flowers are arranged in axillary catkins on the previous year's growth, and the pistillate flowers, which are solitary or in short spikes, are located in the axils of new growth.

FRUIT The fruits are large acorns that reach maturity between late August and late October of their second season. Reddish to dark brown nuts occur singly or in clusters of 2 - 5 and are fully ripe when they can be removed from their shallow cups by tugging slightly.

RANGE The tree is native to the eastern fringes of Nebraska, Kansas and Oklahoma. In Kansas, its range extends into the central portion of the state. Red Oak is planted in USDA zones 4 - 8.

MOISTURE REQUIREMENTS *Quercus rubra* grows best in moist, well-drained soils and does not tolerate flooding. Red Oak seedlings have less drought tolerance than other Oaks.

GROWTH RATE/LIFESPAN Red Oaks grow faster than other Oak species at a rate of up to 2' (0.6 m) per year on good sites and reach maturity between ages 200 and 300.

DISEASES/INSECTS The most serious diseases affecting the species are Oak wilt and foliar diseases. Oak wilt is spread by root grafts in stands of Red Oak and by beetles over longer distances. Foliage diseases which effect the species include anthracnose, powdery mildews, leaf blister and eastern gall rust. Borers and other tunnelers attack the bole, greatly reducing its lumber value. Defoliating insects, such as the gypsy moth, injure or kill Red Oaks by repeatedly stripping their leaves. Insects also attack the acorns and may destroy the entire crop.

OTHER DAMAGING AGENTS Fires easily kill small trees and weaken larger trees, creating entry points for diseases and insects.

ROOT SYSTEM Red Oaks have a small taproot, but the bulks of their root systems consist of deep laterals which make the trees easier to transplant than most Oaks.

HABITAT Red Oak is an upland species that grows to an elevation of 5,500' (1,676 m).

SOIL REQUIREMENTS The trees grow in a variety of loamy soils from moderately coarse, sandy loams to fine clay loam. They also grow in clay. These soils belong to the orders of Spodosols, Alfisols, Inceptisols, Mollisols, Ultisols and Entisols. The trees are sensitive to compacted soils and require a pH level between 4.8 and 6.5. In higher pH soils, they develop chlorosis, but are not as sensitive as Pin Oak (*Q. palustris*).

SUN/SHADE *Quercus rubra* has intermediate shade tolerance.

COMPETITIVENESS Red Oak seedlings don't grow quickly enough to compete with vegetation and most other seedlings. Before age 30, they respond quickly to the release of codominant species or trees with large crowns. After 30, release and thinning cause heavy epicormic branching to occur.

WILDLIFE VALUE Many birds and animals, including turkeys, bluejays, white-tailed deer, black bears, raccoons, squirrels, voles and mice eat Red Oak's acorns. After the nuts are eaten, deer browse the twigs and buds of the tree.

WOOD CHARACTERISTICS Red Oak lumber is whitish to light reddish brown. It is quite hard and heavy and has a straight grain.

PRODUCTS Red Oak wood has a very wide variety of uses including furniture, cabinetry, paneling and veneers. It is also used in ship and boat building, railroad ties, fence posts, pilings and mine timbers, but requires treatment before coming in contact with the soil. The tree is also an excellent source of firewood.

ADDITIONAL COMMENTS The species is widely planted for shade and ornament. It hybridizes with Pin Oak (*Q. palustris*), Black Oak (*Q. velutina*) and Shingle Oak (*Q. imbricaria*).

LIVE OAK / TEXAS LIVE OAK

(*QUERCUS VIRGINIANA*)

&

(*QUERCUS VIRGINIANA V. FUSIFORMIS*)

HEIGHT/SPREAD/DBH Live Oaks grow to a height of 40 - 50' (12 - 15 m). Their spread is much wider and extends 60 - 80' (18 - 24 m). Full sized trees have a diameter (DBH) of 2 - 4' (0.6 - 1.2 m). Texas Live Oak reaches a height of 30 - 40' (9 - 12 m).

FORM Live Oak is distinguished by its long horizontal branches which form a dense, broad crown. Texas Live Oak is a small tree/large shrub with a habit similar to Live Oak.

FOLIAGE Thick, new leaves emerge in Spring and mature to a shiny, dark green. They fall a year later, after new leaves have appeared, giving the species an evergreen appearance and their common names. Texas Live Oak has slightly smaller leaves than Live Oak.

FLOWER Both trees are monoecious and produce male catkins and small clusters of female flowers which appear in the axils of the current growth. Flowering occurs between March and May.

FRUIT Sweet, edible acorns mature within a single season and ripen in September. The dark brown nuts, which occur in clusters of 1 - 5, fall by December. "Fusiformis" refers to the narrowing of the base of the acorn cup, a characteristic used to distinguish Texas Live Oak.

RANGE Live Oak's native range is restricted to the Gulf Coast. It grows in USDA zones 7 - 10. Texas Live Oak is a native of central Texas and sites in Oklahoma and New Mexico. It grows in USDA zones 6 - 7.

MOISTURE REQUIREMENTS Live Oak tolerates flooding and often grows in wet soils. It grows best, however, in moist, well-drained soil. Texas Live Oak is found in dry, sandy soils.

GROWTH RATE/LIFESPAN Both species grow quickly. Many Live Oak specimens, estimated at 500 - 700 years old, have been observed.

DISEASES/INSECTS Live oak decline, a wilt disease, kills thousands of Live Oaks in Texas each year and is a very serious threat to the species. Leaf blisters defoliate both trees at irregular intervals.

OTHER DAMAGING AGENTS Spanish Moss and mistletoe form on the branches of Live Oak, shading out portions of the tree. Fire and cold temperatures easily damage both species due to their thin bark.

ROOT SYSTEM Little information is available on the root system of either tree, but Live Oak is probably deep rooted, because it is a native of areas that are subjected to hurricane force winds.

HABITAT Live Oak is found along streams and in sandy, coastal dunes. Texas Live Oak grows in moist to dry upland soils. Both grow to an elevation of 2,000' (610 m).

SOIL REQUIREMENTS Live Oak grows in sandy soils and the dunes of the Gulf Coast where it is planted for its tolerance to salinity. It adapts to any type of soil and resists compaction. Texas Live Oak is found in limestone soils and along outcroppings.

SUN/SHADE Both species have intermediate shade tolerance and grow in full sun to partial shade.

COMPETITIVENESS Live Oak is a dominant species along the coastal shore because of its high tolerance to salt spray. Both species are very competitive once they are established in good soil.

WILDLIFE VALUE The acorns are eaten by many species of birds and animals including wild turkey, wood ducks, blue jays, quail, deer, squirrels and raccoons.

WOOD CHARACTERISTICS Live Oak and Texas Live Oak are the heaviest North American native hardwoods, weighing 55 - 60 lbs/cubic foot of lumber, air-dried. The yellowish-brown woods are very strong, but their hardness and close grain make them difficult to work.

PRODUCTS Formerly, Live Oak was used extensively in shipbuilding. Today its use is limited to products such as structural beams and posts. Due to their weight, the two species provide the highest quality native firewood.

ADDITIONAL COMMENTS There's much botanical confusion concerning Texas Live Oak. Some authorities list it as a variety of Live Oak, and other books include it under the name Live Oak. It's also called Scrub Live Oak. *Quercus virginiana* is widely used throughout the South as an ornamental shade tree. The acorns of both trees are sweet and edible, but they are not marketed commercially.

NEW MEXICO LOCUST

(*ROBINIA NEOMEXICANA*)

HEIGHT/SPREAD/DBH New Mexico Locust grows to a height of 25' (7.5 m) with a diameter (DBH) of 8" (20 cm).

FORM The plant is grown as a small tree or large shrub. It has an open, spreading crown and tends to form thickets.

FOLIAGE *Robinia neomexicana* has pinnately compound leaves with 15 - 21 leaflets. The pale, bluish green leaflets are round to oblong and have a short bristle at their tip.

FLOWER Drooping clusters of fragrant, showy flowers, whose colors range between purple and pink, bloom from May to August.

FRUIT Three to eight, dark brown, spotted seeds are enclosed in a flattened pod. The reddish, bristly pods open as the fruit reaches maturity in early Autumn.

RANGE The plant's native range is limited, within the Great Plains, to several large, scattered pockets across eastern New Mexico and Colorado.

MOISTURE REQUIREMENTS The plant grows in moist soils.

GROWTH RATE/LIFESPAN *Robinia neomexicana* is a fast growing species.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM The plant's horizontal root system forms a dense thicket of stems. The extensive root system holds the soil together, providing effective erosion control.

HABITAT New Mexico Locusts occurs primarily in moist, stream side soils between the elevations of 4,000 and 8,500' (1,219 - 2591 m).

SOIL REQUIREMENTS

SUN/SHADE

COMPETITIVENESS The plant is an effective competitor due to its fast growth and dense habit.

WILDLIFE VALUE A number of animals browse the plant, including goats, mountain sheep and porcupine. The seed is eaten by Gambel's quail.

WOOD CHARACTERISTICS The wood is yellowish with brown streaks. It is very hard and quite heavy.

PRODUCTS The flowers and seed are edible. The beans are eaten raw or they're dried and cooked.

ADDITIONAL COMMENTS The plant is often used as an ornamental.

WILLOW SPECIES (TREE-FORM)

BLACK WILLOW (*SALIX NIGRA*)

WHITE WILLOW (*S. ALBA*)

PEACHLEAF WILLOW (*S. AMYGDALOIDES*)

HEIGHT/SPREAD/DBH Black Willow grows to a height of 60' (18 m) in the northern portion of its range. In southern areas it reaches 140' (42 m). Its diameter (DBH) ranges from 18" (0.5 m) in the north to 4' (1.3 m) in the south. White Willow grows 75 - 100' (25 - 33 m) with a spread of 50 - 100' (15 - 30 m). Its mature diameter is 2' (0.6 m). Peachleaf Willow grows to a height of 50 - 65' (15.0 - 19.5 m) with a similar spread. Its full diameter is 2' (0.6 m).

FORM Tree-form Willows have open crowns with round to irregular habits.

FOLIAGE Willows are generally one of the first trees to leaf out in early Spring and also one of the first to lose their leaves. The glossy green leaves have silvery undersides and little Fall color.

FLOWER *Salix* is a dioecious species whose often showy catkins appear shortly before or just as the leaves emerge.

FRUIT The fruits are light brown capsules that reach maturity in 40 - 60 days. Their seeds are very small and covered with silky hairs that carry them over long distances. They have no dormancy requirements and a high germination rate. Seeds that land on moist soils germinate within 24 hours, quickly establishing themselves. Black Willow produces seed by the age of 10, with maximum production occurring between 25 and 75.

RANGE Black Willow is native to the eastern central and southern Great Plains, from Nebraska to Texas. White Willow is an introduced species that has naturalized across the eastern half of America and grows in USDA zones 2 - 9. Peachleaf Willow has the most extensive native range, which stretches from central Saskatchewan to the Texas panhandle. Black and Peachleaf Willows are hardy to zone 3a.

MOISTURE REQUIREMENTS Willows are very flood tolerant and grow in poorly drained soils. They are also drought resistant.

GROWTH RATE/LIFESPAN All three species grow at a very fast rate and have short lifespans. Black Willow reaches maturity by 55 and usually dies before 75.

DISEASES/INSECTS Willows are highly susceptible to diseases and insects. Among the most common are willow sawfly which defoliates the trees partially or completely and cytospora canker which injures or kills plants that are weakened by drought.

OTHER DAMAGING AGENTS Fire easily damages or destroys Willows. The wood is weak due to their fast growth, and wind, snow and ice frequently break limbs.

ROOT SYSTEM Flood deposits initiate the development of layers of horizontal roots that grow from adventitious buds on newly covered portions of the stem. Poles as long as 6' (2 m) are driven into stream banks to establish deep root systems quickly. The species' extensive root systems produce masses of suckers for erosion control along stream banks.

HABITAT Willows require continuous moisture throughout the growing season and occur in wet, lowland soils. Peachleaf Willow grows from 500 - 7,000' (150 - 2100 m) in elevation, and Black Willow grows to 5,000' (1500 m).

SOIL REQUIREMENTS Willows grow in most soil types from coarse sands to fine clay loams and are most common in newly-formed Entisols found in and along streams. They require deep, fertile soil with a pH level above 6.5 and resist compaction.

SUN/SHADE *Salix* trees do not tolerate shade.

COMPETITIVENESS Willows are a pioneer on sandbars and along streams. Their inability to tolerate shade allows invasive species and slower-growing trees to succeed them. Willows form dense thickets of root suckers.

WILDLIFE VALUE Tree-form Willows are a valuable asset to wildlife. Their flowers attract honey bees. Deer browse the leaves and twigs while squirrels and rabbits chew the shoots. The trees provide dense cover for birds.

WOOD CHARACTERISTICS The lumber ranges in color from dull white to a light reddish brown. It is weak, light and lacks durability. The wood is relatively shock resistant and has a straight grain.

PRODUCTS Willows are used by honey producers. Their lumber is used to make boxes, crates, inexpensive furniture, pulp, charcoal and firewood. Certain White Willow cultivars have ornamental twigs that are used for basketry.

ADDITIONAL COMMENTS White Willow cultivars such as Laurel Willow (*S. pentandra*) are widely planted for ornament and quick shade.

WESTERN SOAPBERRY

(*SAPINDUS DRUMMONDII*)

HEIGHT/SPREAD/DBH Western Soapberry has a height and spread of 20 - 40' (6 - 12 m) with a mature diameter (DBH) of 1' (0.3 m).

FORM The plant is a small to a medium sized tree that has a crown of upright branches.

FOLIAGE *Sapindus drummondii* has pinnately compound leaves with 11 - 19 leaflets that turn golden yellow in Fall.

FLOWER Perfect, yellowish-white flowers are arranged in long, showy panicles which bloom between May and June.

FRUIT The fruit is a yellow to orange, single-seeded drupe whose skin darkens as it reaches maturity during September and October. The skin contains saponin, a bitter-tasting poison.

RANGE The plant's native range is scattered throughout the southern Great Plains from Kansas to New Mexico and across much of central and western Texas. It grows in USDA zones 5 - 9.

MOISTURE REQUIREMENTS Western Soapberry grows in moist, well-drained soils along streams and much drier, excessively-drained, upland soils.

GROWTH RATE/LIFESPAN The species grows at a slow to a medium rate.

DISEASES/INSECTS *Sapindus drummondii* has few insect or disease problems.

OTHER DAMAGING AGENTS The tree is resistant to wind damage because of its dense, closely-grained wood.

ROOT SYSTEM

HABITAT The tree grows in moist, lowland areas and dry uplands to an elevation of 6,000' (1,829 m).

SOIL REQUIREMENTS Western Soapberry grows in many soil types but is most common in clay and limestone soils.

SUN/SHADE

COMPETITIVENESS

WILDLIFE VALUE Wildlife avoids Western Soapberry. Its fruits are poisonous and the leaves are inedible.

WOOD CHARACTERISTICS The light brown wood is dense, hard and closely grained.

PRODUCTS The wood has few other uses than firewood and basketry. Soapberry seeds are used to make necklaces or buttons.

ADDITIONAL COMMENTS The tree is used for ornament and shade.

BALD CYPRESS

(*TAXODIUM DISTICHUM*)

HEIGHT/SPREAD/DBH Bald Cypress reaches a height of 65 - 120' (20 - 36 m) and has a spread of 25 - 45' (7.5 - 13.5 m). Its diameter (DBH) ranges from 3 - 5' (0.9 - 1.5 m).

FORM Young trees start with a narrow, conical form, but as they grow older, their crowns become rounded and develop broad, flattened tops.

FOLIAGE *Taxodium distichum* is a deciduous conifer. Finely-textured needle-leaves emerge in late May and turn red to orange brown or purple before falling in early October.

FLOWER The species is monoecious. Its male flowers are 3 - 5" (7 - 13 cm), purplish catkins which form the previous Summer and shed their pollen in March and April. The female flowers are tiny green conelets, in groups of 1 - 3.

FRUIT The ball-shaped conelets turn purplish brown as they reach maturity between October and December. They consist of four-sided scales which conceal pairs of triangular seeds.

RANGE Bald Cypress is a Southern tree which is native to eastern and south central Texas. It grows in USDA zones 4 - 9.

MOISTURE REQUIREMENTS The tree commonly occurs in areas subjected to intermittent flooding and grows best in wet soils with very poor drainage. It also does well in moist, well-drained soil but is sensitive to drought.

GROWTH RATE/LIFESPAN *Taxodium distichum* grows at the rate of 1 - 2' (0.3 - 0.6 m) per year until age 50. They reach full height by the age of 200 and begin to die back. Their lifespan is commonly overestimated at 500 - 600 years, because of the tendency to produce false growth rings.

DISEASES/INSECTS The most common pests are fungi such as *Stereum taxodi* which causes brown pocket rot in the heartwood of over mature specimens. Other fungi attack the needles, twigs and sapwood of the tree. Serious insect problems result from baldcypress coneworms which destroy up to 75% of the crop each year and nutria which cut or uproot seedlings before they become established. Insects such as leafrollers, beetles and bagworms also attack Baldcypress, but do not cause serious damage.

OTHER DAMAGING AGENTS Deer and rabbits often clip off seedlings, but new growth usually returns. An aboveground root system, commonly called "knees," improves the species' windfirmness, and enables them to withstand hurricane-force winds.

ROOT SYSTEM Trees under than 10" (25 cm) in diameter (DBH) have a taproot system. Deep, descending roots eventually grow from the taproot, and a lateral root system also develops. The aboveground root system, or "knees," develops from the lateral roots. In a wet floodplain, they grow up to 12' (3.7 m) tall. Much smaller knees are found on specimens outside the floodplain or standing in over 12" (30 cm) of water. The physiological purpose of knees is unknown, but they are thought to play a role in the aeration process.

HABITAT Bald Cypress occur in swamps and low floodplain areas. In Texas, they grow to an elevation of 1,700' (518 m).

SOIL REQUIREMENTS The trees commonly grow in soft soils. They are very resistant to compaction, and require an acid pH of 6.1 - 6.5. They do best in muck or peat moss but also grow in soil textures ranging from clays to the finer sands. *Taxodium distichum* is native to soils of the Spodosol, Ultisol, Inceptisol, Alfisol and Entisol orders.

SUN/SHADE Bald Cypress grows best in full Sun, but it tolerates some shade which slows its growth. Overall, the species has intermediate shade tolerance.

COMPETITIVENESS Newly germinated seedlings require soil that is saturated, but not flooded. They must grow quickly in order for a portion of their crown to remain above water should flooding occur. Bald Cypress stumps produce new growth but few of these stems survive. Those that do, grow irregularly, and they do not produce quality timber.

WILDLIFE VALUE The seed is eaten by squirrels and birds like turkeys, evening grosbeaks, wood ducks and other water fowl. The tall trees provide nesting sites for large birds such as bald eagles and osprey.

WOOD CHARACTERISTICS The color of the wood ranges from light to dark brown which tends to occur in Southern grown trees. The heartwood contains cypressene which is thought to account for Bald Cypress' resistance to decay.

PRODUCTS Bald Cypress is widely used in docks and bridges and for railroad ties. It is also used in furniture-quality products like cabinetry, flooring and millwork. Lower-quality Bald Cypress wood is made into boxes and crates.

ADDITIONAL COMMENTS The tree is grown far to the north of its native range for shade and ornament.

NORTHERN WHITE-CEDAR

(THUJA OCCIDENTALIS)

HEIGHT/SPREAD/DBH *Thuja occidentalis* grows 40 - 50' (12 - 15 m) in height with a spread of 15 - 25' (4.5 - 7.5 m). Its diameter (DBH) ranges from 1 - 2' (0.3 - 0.6 m).

FORM The tree has a narrow, conical form with short, spreading branches.

FOLIAGE Northern White-Cedar is a coniferous species whose pointed needles are yellowish green with bluish undersides.

FLOWER The species is monoecious. Tiny male and female cones form on separate branches and bloom for several weeks in April and May. The males are yellowish and appear at the base of shoots, while the pinkish female cones are located on the terminal branchlets.

FRUIT Pollinated cones mature quickly and are fully grown by August. They begin to release their seed within several weeks and most of them are gone by November. Trees regularly produce fruit by the age of 6 with large crops every 1 - 3 years, but optimum production doesn't begin until after age 75.

RANGE *Thuja occidentalis* are a northern species and native to a small portion of northern Manitoba. It grows in USDA zones 2 - 8.

MOISTURE REQUIREMENTS The tree tolerates flooding and is often found in wet swampy areas where it grows slowly. Its rate of growth is much faster in well drained soils. Northern White-Cedar also tolerates dry soils and it resists drought.

GROWTH RATE/LIFESPAN The species has a slow rate of growth, especially compared with associated species. Its lifespan exceeds 400 years.

DISEASES/INSECTS Northern White Cedar does not have significant disease or insect problems. The most serious insect pests are carpenter ants and leafminers. Fewer serious problems are caused by mites, scale, bagworms, aphids and weevils. Fungi attack the foliage, roots and butts of old or damaged trees. All of these problems are more likely to occur in cultivated plantings such as windbreaks and hedges. Native stands experience few disease problems.

OTHER DAMAGING AGENTS Browsers severely injure the trees by girdling stems or removing the buds and foliage. Fires easily damage the shallow roots and thin, oily bark of the tree. Snow and ice break the limbs and stems, and wind uproots large or defective specimens.

ROOT SYSTEM A young specimen's type of root system is determined by the soil's depth and the source of the seed. In deep, well-drained soils, trees grown from upland seeds develop taproots, and in shallow, wetter soils they have a lateral root system. Seedlings from lowland sources do not show a tendency to develop taproots when planted in upland areas. Eventually they develop systems of shallow, lateral roots in which root grafts occur often. In rocky soils, the roots obtain water and nutrients from cracks in the rocks. Under the right conditions, *Thuja occidentalis* are capable of developing adventitious roots from any of the woody tissues of the plant.

HABITAT Northern White Cedar grows from wet, lowland areas to dry upland sites, but it does not perform well at either extreme. On native sites, it occurs between 500' and 2,000' in elevation.

SOIL REQUIREMENTS The species is resistant to soil compaction and requires a pH level of 6 - 8. It is a native of soils in the Histosol, Inceptisol and Entisol orders and occurs in fine clay soils too moderately coarse loams. *Thuja occidentalis* are a dominant species in swamp areas and experiences its best growth in calcareous soils.

SUN/SHADE The species' shade tolerance is variously classified by different authors from very tolerant to intermediate shade tolerance. At least part of the reason for this is that the seedlings are less shade tolerant than the tree's vegetative reproduction. Overall, Eastern White Cedar is most accurately classified as shade tolerant.

COMPETITIVENESS For their first few years, seedlings are capable of surviving in heavily shaded conditions, but they grow best in full sunlight and respond quickly to release, a trait which they retain until maturity. High mortality rates are common among the seedlings, primarily due to drought. In swamp areas, the species is more likely to reproduce from vegetative growth than seedlings.

WILDLIFE VALUE The foliage is an important source of browse to white-tailed deer and snowshoe hares and is also used by moose. Red squirrels chew the buds each Spring and the seeds which are an important food source to pine siskins are eaten by several warbler species.

WOOD CHARACTERISTICS The wood is very light in color and highly resistant to rot and decay. Northern White Cedar is a highly aromatic, resinous wood that has a straight, even grain.

PRODUCTS The wood is heavily used in products requiring decay resistance such as poles, fenceposts and rustic shingles. Distilled oils from the tree are used in perfumes and medicines and the branch boughs are cut for floral displays.

ADDITIONAL COMMENTS Northern White Cedar is an ornamental species that is used in windbreaks and can be sheared into a hedge.

AMERICAN LINDEN / CAROLINA LINDEN

(*TILIA AMERICANA / T. CAROLINIANA*)

HEIGHT/SPREAD/DBH American Linden, or American Basswood as it is also known, reaches a height of 75' to 140' (23 - 43 m). Its spread is 40 - 70' (12 - 21 m), or approximately one half of the tree's height. Carolina Linden is a smaller tree, reaching 25 - 55' (7.5 - 16.5 m) with a spread of 15 - 30' (4.5 - 9.0 m).

FORM Americana has a conical to rounded form while Caroliniana is more upright. The lower branches of both trees descend to near the ground. Caroliniana's upper branches are upright, but Americana's tend to be more horizontal. American Linden often has multiple stems.

FOLIAGE The trees have dark green, rounded leaves with characteristic indentations at the bases. The leaves' undersides are much lighter in color.

FLOWER Long bracts with green to creamy white flowers bloom for several weeks from late May to early July. The fragrance of the tiny flowers attracts many pollinators.

FRUIT Linden fruits are two-seeded, nut-like drupes that ripen between August and October. They bear fruit by the age of 8, with maximum production occurring between 15 and 100. Large crops are borne most years.

RANGE American Linden is native to the eastern fringes of the Great Plains from Manitoba to Oklahoma and grows in USDA zones 2 - 8. In Nebraska, its range extends westward along the Niobrara River valley. Carolina Linden is a southern tree that is native to southeast Oklahoma and eastern Texas.

MOISTURE REQUIREMENTS The two species have mid-range moisture requirements. They do not tolerate flooding and are sensitive to droughts. Both grow best in moist, well-drained soils.

GROWTH RATE/LIFESPAN The trees grow at a fast to moderately fast pace. American Linden has a life expectancy of 200 years or more.

DISEASES/INSECTS American Linden is attacked by numerous diseases and insects, but few of them cause serious damage. Linden borers drill into the bases of young, weak or aged trees. Defoliators like the forest tent caterpillar and gypsy moths devour the leaves. The most common diseases are anthracnose and leaf spots. Decay, which is caused by rot and stain fungi, is very prominent in trees older than 120 and greatly reduces their timber value.

OTHER DAMAGING AGENTS Rodents chew the bark of Lindens and may girdle them completely. Lindens are susceptible to fire because of their thin bark.

ROOT SYSTEM Development of the root system starts with a deep taproot during the seedling stage that is replaced by heavy lateral roots. Eventually, oblique laterals give rise to a system of surface laterals. Lindens grown in sand dunes develop adventitious roots along newly buried portions of their stems.

HABITAT Both species commonly occur in moist, upland soils, but also grow along exposed ridgelines and in sandy soils and dunes. *Americana* grows to an elevation of 3,200' (975 m), and *Caroliniana* grows to 2,000' (610 m).

SOIL REQUIREMENTS The trees are sensitive to compaction and grow in coarse to medium textured soils such as sandy loam, rocky soils and silt loam. They also grow in calcareous soils. *Americana* requires a pH level between 4.5 and 7.5 and is a native of soils of the Inceptisol and Spodosol orders.

SUN/SHADE Lindens, especially seedlings, tolerate shade. However, once established, their growth is limited by shade.

COMPETITIVENESS Linden species tend to sprout prolifically at the base. Their sprouts grow quickly and they are harvestable.

WILDLIFE VALUE The seed is eaten by mice, squirrels, chipmunks and bobwhite quail. Rabbits and rodents devour the seedlings, and the foliage is browsed by deer and rabbits.

WOOD CHARACTERISTICS Linden wood is a light colored wood known for its softness and low density. These qualities make it very easy to work by hand. *Caroliniana* weighs less than *Americana*.

PRODUCTS Linden wood is commonly used for carving. It is also made into furniture, cabinetry and musical instruments. Linden wood is a high-quality firewood that is used for paper pulp. The flowers produce large amounts of nectar which bees use to make distinctively-flavored honeys.

ADDITIONAL COMMENTS Lindens have high nutrient demands and grow best in rich soils. The fallen leaves have high concentrations of nitrogen, potassium, calcium and magnesium.

AMERICAN ELM

(*ULMUS AMERICANA*)

HEIGHT/SPREAD/DBH On good sites, American Elm reaches 100 - 125' (30 - 37.5 m). Its spread varies between one half and in excess of its height. Diameters (DBH's) on these sites are 4 - 5' (1.3 - 1.6 m). On poor sites, height is usually limited to 40 - 60' (12 - 18 m).

FORM The species has a distinctive, weeping form. The vase-shaped crown has pendulous lower branches and a flat to rounded top.

FOLIAGE Glossy, dark leaves emerge as early as the end of February. In the Fall, they turn dull to bright yellow before dropping in mid October.

FLOWER Perfect flowers bloom on individual, drooping pedicels for several weeks between early February and late May. The flowers, which appear before leaf emergence, are self-sterile.

FRUIT Fruit development is rapid, and seed dispersal occurs between mid March and late June. Wind-blown American Elm seeds may travel as far as a quarter mile, but most fall within 100 yards of their source. Waterborne seeds usually travel much further. Fruit production begins by the age of 15, with optimum production after 40. Fruiting may continue beyond age 300. Large crops are borne most years, however, a wet Spring greatly limits fruit production.

RANGE *Ulmus americana*'s native range extends across much of the eastern two thirds of the Great Plains. It is also native to portions of Saskatchewan and Montana and grows in USDA zones 2 - 9.

MOISTURE REQUIREMENTS The trees withstand off-season floods, but extended flooding during the growing season often kills them. American Elms grow best in moist soils with good drainage and they tolerate dry soils and drought.

GROWTH RATE/LIFESPAN *Ulmus americana* has a medium to fast rate of growth. It reaches maturity by 150, and usually lives past 300.

DISEASES/INSECTS In the last 60 years, Dutch Elm disease, which is spread by the European elm bark beetle, has killed a high percentage of the American Elms in the Great Plains. Several resistant cultivars are available, but their long term success is undetermined. Other serious Elm diseases include verticillium wilt, phloem necrosis, leaf black spot, wood rot fungi and cankers. Many types of insects such as defoliators, borers, leaf rollers and sucking insects attack the trees.

OTHER DAMAGING AGENTS Trees growing in bottom lands across the southern United States are highly susceptible to fire damage. Northern specimens with forked habits are easily damaged by ice and wet snow.

ROOT SYSTEM The type of root system that a tree has is determined by the soil's texture and moisture level. In heavy, wet clays, fibrous roots are spread throughout the top 3 - 4' (1.0 - 1.3 m) of soil. In moist, medium-textured soil, lateral roots may extend 10' (3.3 m) downward. In drier, sandy soil, American Elm has a taproot as deep as 20' (6 m).

HABITAT The species' habitat extends from lowland areas with wet soils to dry sites further uphill. It performs best in moist to dry, deeply-tabled upland soils and grows to an elevation of 2,500' (762 m).

SOIL REQUIREMENTS American Elm has intermediate resistance to compaction and requires a pH level between 5.5 and 8.0. The tree is found in many types of soil from bogs and clay to loamy gravel, but does not perform well in dry sands or high tabled soils. American Elm is native to soils from the Alfisol, Mollisol, Inceptisol and Ultisol orders.

SUN/SHADE One third of full sunlight is optimal for seedling establishment. After their first year, American Elms grow best in full Sun.

COMPETITIVENESS Young trees persist in the shade of pioneers like Willow and Cottonwood and respond quickly to release, outperforming older, associate species. Once they attain dominance, American Elm maintain their height advantage. *Ulmus americana* tends to invade abandoned fields.

WILDLIFE VALUE The fruits are eaten by mice, squirrels, opossum, ruffed grouse, bobwhite and partridge. Gray squirrels eat the flowers, buds and fruit.

WOOD CHARACTERISTICS The wood is grayish to light brown with a reddish tinge. American Elm has a stiff, interlocked grain which makes splitting difficult.

PRODUCTS American Elm is used for furniture-quality products like paneling, interior trim and Danish style furniture. It is also used for construction and general purposes such as crates, plywood and pulp.

CHINESE ELM

(*ULMUS PARVIFOLIA*)

HEIGHT/SPREAD/DBH Chinese Elm reaches a full height of 40 - 50' (12 - 15 m) with a spread of 20 - 30' (6 - 9 m) or one half its height. The diameter (DBH) of a fully grown tree is 18 - 36" (0.5 - 1.0 m).

FORM The species have broad crowns and pendulous lower branches.

FOLIAGE In southern areas, the glossy leaves turn yellow in the Fall, while trees farther north have reddish purple leaves at that time. The small leaves persist until Winter.

FLOWER *Ulmus parvifolia* is a late flowering tree with small clusters of inconspicuous flowers at the base of its leaves in August and September.

FRUIT One-seeded, pale yellow samaras reach maturity in September and October. The samara's broad wing enhances seed dispersal.

RANGE Chinese Elm is a native of eastern Asia and grows in USDA zones 4 - 9.

MOISTURE REQUIREMENTS The tree grows best in moist, well-drained soils and is highly resistant to drought.

GROWTH RATE/LIFESPAN Chinese Elms grow at a medium to fast rate.

DISEASES/INSECTS The tree is more resistant to Dutch Elm disease and beetles than other *Ulmus* species.

OTHER DAMAGING AGENTS Younger specimens may be susceptible to herbicide injury.

ROOT SYSTEM

HABITAT The tree grows to 7,000' in elevation.

SOIL REQUIREMENTS *Ulmus parvifolia* is highly adaptable to pH levels and soil types and is a good choice for poor soils.

SUN/SHADE

COMPETITIVENESS

WILDLIFE VALUE The seeds are eaten by several types of birds. Elms are a favorite nesting site for orioles.

WOOD CHARACTERISTICS

PRODUCTS

ADDITIONAL COMMENTS Chinese Elms are planted in shelterbelts and for shade and ornament. New cultivars have been selected for form and hardiness. The tree is often confused with Siberian Elm (*U. pumila*) which is sometimes marketed as "Chinese Elm."

SIBERIAN ELM

(*ULMUS PUMILA*)

HEIGHT/SPREAD/DBH Siberian Elm grows to a height of 60' (18 m) and has a spread of 45' (13.5 m). Its full diameter (DBH) is 1.5' (0.5 m).

FORM The tree has a rounded crown with spreading branches.

FOLIAGE The small dark leaves of Siberian Elm turn yellow in the Fall.

FLOWER Clusters of perfect, inconspicuous flowers appear in the Spring before the leaves emerge.

FRUIT The fruits are one-seeded, round samaras that mature quickly and are widely dispersed by the wind.

RANGE The tree is native to northeast Asia and was introduced in the 1800's. It has naturalized across much of the Great Plains and grows in USDA zones 4 - 9.

MOISTURE REQUIREMENTS Siberian Elm grows best in dry soils and is highly resistant to drought. It is ideally suited to cold, dry climates.

GROWTH RATE/LIFESPAN The tree grows at a very fast rate.

DISEASES/INSECTS *Ulmus pumila* is resistant to Dutch elm disease and phloem necrosis. It is susceptible to wetwood, however, which can lead to a decline in the tree's health. Defoliating insects attack the leaves of Siberian Elms.

OTHER DAMAGING AGENTS The tree's slender branches break frequently due to wind and ice.

ROOT SYSTEM

HABITAT Siberian Elms grow in moist soils along streams but are more likely to occur in dry upland areas. They grow between 1,000 and 5,000' (305 - 1524 m) in elevation.

SOIL REQUIREMENTS The species grows in any type of soil and thrives in poor soils where few other plants grow.

SUN/SHADE

COMPETITIVENESS The tree is invasive and highly competitive. Wind-blown seeds germinate quickly and grow nearly anywhere, producing many seedlings each Spring. Siberian Elms resprout quickly and are very difficult to get rid of.

WILDLIFE VALUE The tree provides cover to several game bird species.

WOOD CHARACTERISTICS The lumber is hard and heavy, but brittle and difficult to split.

PRODUCTS Siberian Elm coppices readily and provides low to medium quality firewood. In Asia, the wood is used to make several products.

ADDITIONAL COMMENTS The tree is planted in shelterbelts and windbreaks and used extensively in the western and northern Great Plains where growing conditions are difficult. Several cultivars have been selected for form, resistance to breakage or cold hardiness. Siberian Elm crosses with other elm species and has the potential to develop Dutch elm resistant hybrids.

ALDER SPECIES

EUROPEAN ALDER (*ALNUS GLUTINOSA*) SPECKLED ALDER (*A. RUGOSA*) HAZEL ALDER (*A. SERRULATA*)

HEIGHT/SPREAD/DBH European Alder reaches 40 - 70' (12 - 18 m) in height and has a spread of 20 - 40' (6 - 12 m). Its diameter (DBH) is 1 - 3' (0.3 - 1.0 m). The other plants are smaller and grow 20 - 30' (6 - 9 m) with single or multiple stem trunks as large as 4" (10 cm) in diameter (DBH).

FORM European Alder is a tall, narrow tree with a pyramidal to oblong habit and is also grown as a multi-stemmed plant. Speckled Alder and Hazel Alder are small trees or large shrubs with irregular, spreading habits.

FOLIAGE Alders have attractive, rounded leaves with dark glossy tops and pale undersides covered with rust colored hairs. The leaves stay green in the Fall or turn brown. Alder leaves have high concentrations of nitrogen, and the plants produce large masses of fallen leaves. Alder leaves decompose faster than associated species, and quickly lose their soluble organic substances.

FRUIT The fruits are persistent, cone-like structures with thickened scales that enclose a single seed apiece. The clustered strobili release seeds gradually, starting between late September and November and continuing throughout the Fall and Winter. The tiny, wingless seeds have bladders that enable them to float on the water and move over great distances. Trees begin to produce large crops as early as the ages of 6 or 7, and usually produce large crops in succeeding years.

RANGE *Alnus rugosa* is a Canadian species whose range extends across Manitoba and Saskatchewan and into North Dakota. It grows in USDA zones 3-6. *Alnus serrulata* is a southern plant that is native to the eastern fringe of the Great Plains from Kansas to Texas and is hardy to Zone 5a. European Alder is an introduced species from Europe and Asia that has become naturalized across southern Canada and northeastern America and grows in zones 3 - 7.

MOISTURE REQUIREMENTS Alders are highly tolerant of flooding and grow in wet to moist soils along waterways. The seedlings withstand flood conditions in which other species do not survive, and Alders are also resistant to drought.

GROWTH RATE/LIFESPAN Alders grow quickly, reaching up to two thirds of their full height within 25 years and generally have short lifespans that last up to 125 years.

DISEASES/INSECTS *Alnus glutinosa* is attacked by a number of diseases and insects, however, most cause relatively little harm to the trees. The most serious pests are the striped alder sawfly, the alder flea beetle and wooly alder aphid. Fungal diseases have been observed on trees killed by wooly alder aphids. Tent caterpillars are a potentially serious problem on European Alders and Speckled Alders.

OTHER DAMAGING AGENTS Hazel Alder's shallow root system makes it susceptible to wind throw, especially in wet soils.

ROOT SYSTEM European Alders have both extensive, fibrous root systems which are very shallow and deep taproots that extend beneath the water table. All Alder species fix nitrogen and have either a single large root nodule near their root crown, or a large number of much smaller nodules spread throughout their surface roots. Plants growing in soils with sufficient concentrations of molybdenum, tend to have a single large root nodule, while those occurring in soils which are deficient have many smaller nodules that weigh less overall and produce less nitrogen. During flooding, the root system continues to function for up to a week and resumes activity once the waters subside.

HABITAT Alders grow in low, wet to moist soils along streams and rivers and occur at elevations as high as 3,000' (914 m) in southern latitudes. Plants in the northern portions of their ranges grow at much lower elevations.

SOIL REQUIREMENTS Alders are very resistant to compaction and grow best in soils of the Histosol, Entisol and Inceptisol orders. They occur in a wide range of soil textures but grow best in finer soils such as silt, peat or mucks. Alders are very tolerant of low pH levels and achieve their highest germination rates at a pH level of 4.0. The optimum pH range for root nodulation, which occurs during the first year, is 5.5 - 7.0, with a minimum level of 3.4. Due to a high concentration of nitrogen in the heavy mass of litter that Alders produce, the pH of the soil eventually drops, while its concentration of soluble salts increases. Alders do not grow well in heavy clay soils with pH levels higher than 8.0, and in general, their growth is reduced or stunted in neutral to alkaline soils.

SUN/SHADE Alders are very intolerant of shade.

COMPETITIVENESS The shallow, fibrous roots of Speckled and Hazel Alders send up multiple suckers and develop into dense colonies. European Alders regenerate by sprouting from stumps. The nitrogen fixing qualities of Alders enhance the growth of nearby trees and they are recommended for mixed plantings in nitrogen-poor soils. A study in which European Alder seedlings were interplanted into a two year old plantation of Black Walnuts (*Juglans nigra*) found that the height and diameter of the Walnuts increased compared with pure stands. The Alders experienced no ill effects, until falling into a sudden decline, which occurred between the ages of 8 and 12, and died shortly thereafter, probably due to the allelopathic effects of juglone.

WILDLIFE VALUE Alders are a valuable wildlife resource. The cones open gradually, releasing food for seed-eating birds such as pine siskins and goldfinches. European Alders provide dense cover, and are recommended for shelterbelt use to create pheasant habitats. Speckled Alders are frequented by grouse which eat the buds, and rabbits, deer and moose browse the twigs. Hazel Alders are also browsed by deer and their seed is eaten by small birds.

WOOD CHARACTERISTICS Currently, none of these Alder species are used in wood products other than firewood.

PRODUCTS Alders have high potential for biomass production in pure and mixed stands. European Alder also has promise as a furniture wood.

ADDITIONAL COMMENTS Alders are sometimes planted for the ornamental qualities of their flowers and glossy leaves. All portions of the plant store significant concentrations of nitrogen.

AMELANCHIER SPECIES

SASKATOON SERVICEBERRY (*AMELANCHIER ALNIFOLIA*)

DOWNTY SERVICEBERRY (*A. ARBOREA*)

ROUNDLEAF SERVICEBERRY (*A. SANGUINEA*)

UTAH SERVICEBERRY (*A. UTAHENSIS*)

HEIGHT/SPREAD/DBH The plants range in height from 20' (6 m) (Roundleaf Serviceberry) to 40' (12 m) (Downy Serviceberry). Saskatoon and Utah Serviceberrys are 25 - 30' (8 - 12 m) in height.

FORM Serviceberries are either grown as small trees with rounded crowns or large shrubs with irregular, spreading forms.

FOLIAGE The leaves range in texture from papery to leathery and in color from yellowish to dark green. All have alternate, simple leaves with pale undersides. Utah Serviceberry has smaller leaves than the other plants.

FLOWER Amelanchiers produce clusters of perfect, star-shaped flowers that bloom as the leaves emerge, or just prior to emergence. Utah Serviceberry's flowers are pinkish or white. The other species produce white flowers.

FRUIT The plants produce clusters of purple to blackish, edible fruits that reach maturity in June and July. Utah Serviceberry fruits mature in the Fall.

RANGE Utah Serviceberry is a western plant that grows from Wyoming to New Mexico. Saskatoon Serviceberry is a northern species which is native to the central Canadian provinces, the Dakotas, northern Nebraska and eastern Wyoming and Montana. It grows in USDA zones 2 - 4b. Roundleaf Serviceberry is a northeastern shrub which is native to eastern South Dakota. Downy Serviceberry is a native of eastern Kansas and Oklahoma.

MOISTURE REQUIREMENTS All of the Serviceberries covered here are drought tolerant. Utah Serviceberry is found in dry soils, but the other plants grow in moist to dry conditions. There is little information on the genus' flood tolerance, but Roundleaf Serviceberry is intolerant of flooding.

GROWTH RATE/LIFESPAN

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM Roundleaf Serviceberry has a shallow root system.

HABITAT Utah Serviceberry is found in dry upland areas of the western Great Plains. The remaining species grow in moist stream side areas as well as dry, rocky soils. Roundleaf Serviceberry grows to 2,000' (610 m) in elevation. Downy and Saskatoon Serviceberries grow to 6,000' (1829 m), and Utah Serviceberry grows from 3,900' - 7,900' (1,200 - 2,400 m) in elevation.

SOIL REQUIREMENTS Roundleaf Serviceberry grows in the coarse and medium textured soils of dry uplands as well as finer, organic soils along streams. Its pH requirements range from slightly acid (6.1) to alkaline (8.5). Saskatoon Serviceberry tolerates alkaline soils.

SUN/SHADE Amelanchiers require full sun to partial shade.

COMPETITIVENESS

WILDLIFE VALUE Serviceberries are very valuable to wildlife. Collectively, at least 42 species of birds feed on their fruits and many animals browse the leaves and twigs. The list of birds includes woodpeckers, robins, cedar waxwings, northern oriole, bluebirds, grosbeaks, cardinals, wood thrush and ruffed grouse. The fruits of Downy Serviceberry are eaten by thrushes, squirrels and bear. Utah Serviceberry fruits are eaten by many types of birds and ground squirrels. Saskatoon Serviceberry fruits are eaten by northwest chipmunks, red squirrels and black bears. Serviceberries are an important source of browse to whitetail and blacktail deer, moose, sheep, goats and cattle.

WOOD CHARACTERISTICS The wood is very strong and hard, but none of the plants grow large enough to produce lumber commercially.

PRODUCTS The wood is sometimes used to make small articles like handles. The fruit is made into pies, jellies and baked goods or dried for later use.

ADDITIONAL COMMENTS Amelanchiers are grown as ornamentals for their flowers.

ARONIA SPECIES

RED CHOKEBERRY (ARONIA ARBUTIFOLIA) BLACK CHOKEBERRY (A. MELANOCARPA)

HEIGHT/SPREAD/DBH Red Chokeberry grows 3 - 10' tall (1 - 3 m) and has a spread of 3 - 5' (1 - 1.5 m). Black Chokeberry grows 3 - 5' tall (1 - 1.5 m).

FORM Both plants form wide-spreading colonies of multiple suckers.

FOLIAGE Plants of the Aronia genus have simple, alternate leaves. Black Chokeberry's attractive, glossy leaves emerge in late April and Red Chokeberry's appear by early May. In the Fall, Red Chokeberry leaves turn red to orange before dropping in October. Black Chokeberry's leaves are crimson in Autumn and fall in early November.

FLOWER The plants are monoecious and produce corymbs of white flowers that bloom from early to mid May on Black Chokeberry and mid to late May on Red Chokeberry.

FRUIT Red Chokeberry produces dense clusters of red berries which mature between early September and mid December. Black Chokeberry has loose clusters of purple to black berries between early September and late November.

RANGE Red Chokeberry is native to the eastern seaboard and portions of eastern Texas. It grows in USDA zones 4 - 9. Black Chokeberry is a northern species from outside the Great Plains that grows in USDA zones 3 - 9.

MOISTURE REQUIREMENTS Aronias are very flood tolerant and grow well in poorly drained soils. Their moisture tolerance extends to dry soils, although Black Chokeberry is more drought resistant than Red Chokeberry.

GROWTH RATE/LIFESPAN Both plants grow slowly and have short lifespans.

DISEASES/INSECTS Neither shrub has serious disease nor insect problems. The round-headed apple borer is their most frequent insect problem, and a short list of Aronia diseases includes twig and fruit blight, leaf spots and rust.

OTHER DAMAGING AGENTS Aronias are rarely damaged by winds or ice.

ROOT SYSTEM The plants produce dense systems of shallow, fibrous roots that sucker profusely and transplants easily.

HABITAT Red Chokeberry is found in wet lowlands. Black Chokeberry also grows in these areas and in dry upland soils.

SOIL REQUIREMENTS Both grow in a wide range of soils, from finely textured clays to coarse sands and gravel, although Black Chokeberry is better adapted to the latter. Aronias are resistant to soil compaction and require a pH between 5.1 and 6.5.

SUN/SHADE Aronias grow from full sunlight to half shade.

COMPETITIVENESS The plants' adaptability to soil types, light conditions and moisture regimes makes them effective competitors.

WILDLIFE VALUE Both shrubs have intermediate wildlife value, although Black Chokeberries are less astringent, and are eaten by more than 10 species of birds, including cedar waxwings and brown thrashers. Aronias are heavily browsed by rabbits.

PRODUCTS Black Chokeberries, and probably Red Chokeberries, can be made into brightly colored jellies and preserves.

ADDITIONAL COMMENTS Aronias are excellent riparian plants for erosion control.

PAWPAW

(*ASIMINA TRILOBA*)

HEIGHT/SPREAD/DBH Pawpaws grow 16 - 33' (5 - 10 m) tall and their spreads equal their heights. A fully grown plant's trunk diameter (DBH) is 8" (20 cm).

FORM Pawpaws are grown as small trees or large shrubs. The tree form has a straight bole and an irregular crown of spreading branches. As shrubs, Pawpaws form dense colonies.

FOLIAGE The plant has long papery leaves that are light green in the Summer and pale yellow in the Fall. They have an unpleasant odor when crushed.

FLOWER Pawpaws are monoecious, and their purple, bell-shaped flowers bloom from early to mid May. The three-petaled flowers are hairy, with prominent veins, and their fragrance resembles fermenting grapes.

FRUIT The greenish yellow fruits are berries that turn black as they reach maturity between mid August and September. Their shape varies from rounded to banana-like, and each fruit contains several large, oblong seeds.

RANGE *Asimina triloba* is a native of the eastern Great Plains, from southeastern Nebraska to east Texas and grows in USDA zones 5 - 8.

MOISTURE REQUIREMENTS Pawpaws are moisture-sensitive plants which are intolerant of flooding and sensitive to drought. They grow best in moist, well-drained soils.

GROWTH RATE/LIFESPAN The growth rate for the species is medium to fast.

DISEASES/INSECTS The species is not seriously affected by diseases or insects.

OTHER DAMAGING AGENTS

ROOT SYSTEM *Asimina triloba*'s root system consists of thick lateral roots that extend deeply into the soil, making the species difficult to transplant. Shrub-form Pawpaws send up many root suckers.

HABITAT Pawpaws are found in deep, moist soils between the flood plain and mesic, upland sites. They grow to an elevation of 2,600' (792 m).

SOIL REQUIREMENTS The plants grow in loamy soils which range in texture from moderately coarse to moderately fine. They require a pH level of 6.1 - 8.0 and are sensitive to compaction.

SUN/SHADE Pawpaws are common in the understory, but grow larger and fuller in the Sun.

COMPETITIVENESS In its shrub-form, the plant is an effective competitor due to its growth rate and dense habit.

WILDLIFE VALUE The fruits are eaten by relatively few animals, but are favored by raccoons, opossums, squirrels, bears, turkeys and several other birds

WOOD CHARACTERISTICS The wood is soft and weak, and the plant doesn't produce enough of it for commercial production.

PRODUCTS The yellow pulp of the fruit is highly nutritious and tastes like custard or bananas, but Pawpaws are seldom used in food products or sold commercially.

ADDITIONAL COMMENTS Several available cultivars have been selected for fruit production.

GUM BUMELIA OR CHITTAMWOOD

(*BUMELIA LANGUINOSA*)

HEIGHT/SPREAD/DBH Two varieties of Gum Bumelia are native to the Great Plains. Variety *albicans*, grows 40 - 60' tall (12 - 18 m) and has a diameter (DBH) of up to 2' (0.6 m). Variety *rigida*, is a smaller, western species that grows to 12' (3.6 m) in height and has a diameter (DBH) of 8" (20 cm).

FORM Both varieties have narrow crowns that are characterized by short branches covered with thick spines.

FOLIAGE Chittamwood leaves are dark glossy green and have a leathery texture. They persist after the growing season and fall intermittently throughout Autumn and Winter. The leaves of the two varieties are distinguishable by their pubescence. *Albican* leaves are covered with gray to rust colored hairs, while *rigida*'s white to tan hairs are most prominent on the undersides of the leaves.

FLOWER The plants produce clusters of white, bell-shaped flowers in June and July. Each cluster holds 12 - 18 flowers.

FRUIT The fruit is a one-seeded, purple to black berry that matures from September - October.

RANGE The *albicans* variety is native to an area extending from southeast Kansas through central Texas. *Rigida* is a western species, which is native to southwest Oklahoma, Texas and New Mexico.

MOISTURE REQUIREMENTS Bumelias' moisture tolerance extends from well-drained soils to very dry conditions.

GROWTH RATE/LIFESPAN

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT The plants are commonly found along streams, but also grow in the dry, rocky uplands. *Albicans* grow to 2,500' (762 m) in elevation, and *rigida* grows to 5,000' (1,524 m).

SOIL REQUIREMENTS *Bumelias* grow in soils ranging from coarse sands to medium textured soils along streams.

SUN/SHADE

COMPETITIVENESS Both plants habit of forming dense thickets make them effective competitors.

WILDLIFE VALUE The fruits are eaten by quail, turkey, thrashers and other birds. Deer eat the fruit and also browse the leaves.

WOOD CHARACTERISTICS Chittamwood is soft and weak despite its close grain and heavy weight, and it is not in wide commercial use.

PRODUCTS Chittamwood is used on a local basis for cabinetry wood, and it is made into tool handles.

ADDITIONAL COMMENTS *Bumelia* fruits are edible, but they tend to upset the stomach. The species is a part of the tropical, sapote family (Sapotaceae) and exudes a thick, chewable gum from wounds to their trunks. The varieties tendencies to form dense thickets make them ideal for riparian erosion control.

SIBERIAN PEASHRUB

(CARAGANA ARBORESCENS)

HEIGHT/SPREAD/DBH Siberian Peashrub grows 12 - 20' (4 - 6 m) tall and has a spread of 8 - 18' (2.5 - 5.5 m).

FORM The species usually form erectly-shaped shrubs but may also be grown as small trees.

FOLIAGE The bright green leaflets of the Siberian Peashrub turn yellowish green in the Fall.

FLOWER The plant produces clusters of bright yellow flowers. The small, perfect flowers bloom from early to mid May, when the leaves are at 2/3 of their full size.

FRUIT Siberian Peashrub is a leguminous plant with flattened 2" (5 cm) pods that contain 3 - 5 seeds. The pods turn brown at maturity in July and August.

RANGE The plant is native to Siberia and Inner Mongolia and grows in USDA zones 2 - 7.

MOISTURE REQUIREMENTS *Caragana arborescens* grow in moist to dry soils and are highly resistant to drought.

GROWTH RATE/LIFESPAN Siberian Peashrub grows at a medium to fast rate.

DISEASES/INSECTS The plant is not subject to serious injuries from diseases or insects. Leafhoppers cause damage like leaf wilting and disfigured growth to younger plants.

OTHER DAMAGING AGENTS Siberian Peashrub is highly resistant to the strong winds and intense cold that are common to the Northern Great Plains.

ROOT SYSTEM

HABITAT The plant is ideally suited to dry, upland soils.

SOIL REQUIREMENTS Siberian Peashrub fixes nitrogen and is adaptable to many types of soil, including alkaline soils.

SUN/SHADE *Caragana arborescens* grow in full Sun to light shade.

COMPETITIVENESS The plant is extremely cold hard and tolerates tough weather conditions.

WILDLIFE VALUE

PRODUCTS

ADDITIONAL COMMENTS Siberian Peashrubs are commonly used in shelterbelts and windbreaks across the Canadian Great Plains.

BUTTONBUSH

(*CEPHALANTHUS OCCIDENTALIS*)

HEIGHT/SPREAD/DBH *Cephalanthus occidentalis* grow to 20' (6 m) in height with a spread of 20' (6 m) or more. A fully grown plant has a diameter (DBH) as large as 4" (10 cm).

FORM Buttonbush is grown as small trees or large shrubs. They have unruly, spreading forms, with many crooked branches close to the ground.

FOLIAGE Papery leaves emerge in early June and mature to a dark glossy green. In late Summer, they turn yellowish before dropping in early September.

FLOWER Buttonbush is a monoecious plant that is named for its fragrant white flowers which are arranged in dense heads. The flowers bloom from June to September.

FRUIT The rounded, multiple fruits are made up of tightly packed, brown nutlets. The fruits mature in September and persist until January.

RANGE The plant is native to southeastern Nebraska and the eastern halves of Kansas, Oklahoma and Texas. *Cephalanthus occidentalis* grow in USDA zones 5 - 10.

MOISTURE REQUIREMENTS Buttonbush is a floodplain species which requires wet to moist soils and is highly tolerant of flooding. The species is sensitive to drought, and plants seeded outside of the floodplain die quickly.

GROWTH RATE/LIFESPAN *Cephalanthus occidentalis* are a short-lived plant that grows at a medium to fast rate.

DISEASES/INSECTS The species has few serious diseases or insect problems. Leaf spots, rusts, powdery mildew and scale are the most frequently encountered problems.

OTHER DAMAGING AGENTS

ROOT SYSTEM The tree has a fibrous root system of laterally-growing, shallow roots. Buttonbushes are easily transplanted.

HABITAT The plants only grow on wet to moist, lowland sites or in water to an elevation of 3,000' (914 m).

SOIL REQUIREMENTS Buttonbush performs well in the variable soils along streams and within floodplains, from coarse sands and gravel to tightly-packed clay soils, peat and mucks. Buttonbush's pH tolerance also varies widely from 6.1 - 8.5.

SUN/SHADE *Cephalanthus occidentalis* require full sunlight and do not tolerate shade.

COMPETITIVENESS The plants multiply rapidly to form pure stands.

WILDLIFE VALUE The fruits are eaten by more than 25 species of waterfowls and shorebirds and used by 10 or more species for nesting and cover. The leaves and twigs are browsed by white-tail deer, but may be poisonous to cattle.

WOOD CHARACTERISTICS The wood is not used commercially although it is light weight, durable and hard.

PRODUCTS Buttonbush's flowers are especially attractive to bees and the species has potential for use in honey production.

ADDITIONAL COMMENTS *Cephalanthus occidentalis* are often planted as an ornamental species.

FLOWERING QUINCE

(CHAENOMELES SPECIOSA)

HEIGHT/SPREAD/DBH Flowering Quince grows to a height of 6 - 10 feet (2 - 3 m). The plant's spread is roughly equal to its height.

FORM Flowering Quince has a rounded outline.

FOLIAGE The glossy, dark green foliage turns brownish in the Fall.

FLOWER The plant's chief ornamental asset is its flowers which bloom for one to two weeks between January and May. The flowers may be solitary or clustered and they bloom prior to leaf emergence.

FRUIT The fruits are small pomes that mature between mid-Summer and October.

RANGE Flowering Quince grows in USDA zones 4 - 8.

MOISTURE REQUIREMENTS The plants grow from moderately well-drained soils to very dry conditions. They adapt to moisture situations and are very drought tolerant.

GROWTH RATE/LIFESPAN The species has a medium rate of growth.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT

SOIL REQUIREMENTS *Chaenomeles speciosa* requires a soil pH between 6.0 and 7.5, and it is chlorotic in higher pH soils.

SUN/SHADE Flowering Quince grows in full sunlight to light shade.

COMPETITIVENESS The plant's competitiveness is enhanced by its adaptability to soil conditions.

WILDLIFE VALUE The plant's tangled branches and sharp spines provide excellent cover for birds and small animals.

PRODUCTS The fruit is used to make jelly, but a number of plants are required.

ADDITIONAL COMMENTS

PAGODA DOGWOOD

(CORNUS ALTERNIFOLIA)

HEIGHT/SPREAD/DBH Pagoda Dogwood grows to a height of 15 - 25' (4.5 - 7.5 m) and has a spread between 20 and 30' (6 - 9 m). A fully grown plant's diameter (DBH) is 8" (20 cm).

FORM The shrub's common name is derived from its tiered horizontal branches.

FOLIAGE The leaves are medium to dark green and turn yellow or reddish in the Fall. The term "alternifolia" relates to the fact that the Pagoda Dogwood is the only member of the *Cornus* species to have alternate leaves.

FLOWER White flowers are arranged in showy cymes that bloom between May and early June.

FRUIT Pagoda Dogwood produces blue to black berries that mature between July and August and persist through Fall and Winter.

RANGE *Cornus alternifolia* is a native of southern Manitoba and grows in USDA zones 3 - 7.

MOISTURE REQUIREMENTS The plant requires moist soils that are moderately well drained.

GROWTH RATE/LIFESPAN Pagoda Dogwoods establish themselves slowly and grow at a medium to fast rate thereafter.

DISEASES/INSECTS Diseases which effect the plants include cankers, flower and leaf blights, powdery mildew and leaf spots. The most serious insect threat to the species comes from borers.

OTHER DAMAGING AGENTS *Cornus alternifolia* is easily damaged by fire due to its thin bark.

ROOT SYSTEM The root system is composed of fibrous, spreading roots.

HABITAT Pagoda Dogwoods are found along streams and in lowland areas with moist soils. They grow to an elevation of 6,500' (1981 m).

SOIL REQUIREMENTS The plants grow best in acid soils which range in pH between 5.5 and 7.0.

SUN/SHADE *Cornus alternifolia* requires full sun to light shade.

COMPETITIVENESS The shrub is a good choice for naturalized areas although it grows poorly in competition with the Flowering Dogwood (*C. florida*).

WILDLIFE VALUE The persistent fruits are eaten by more than 34 species of birds including woodpeckers, thrush, eastern bluebirds, grouse, pheasants, turkeys, cedar waxwings and prairie chickens. They are also eaten by squirrels. The plant is browsed by white-tailed deer and cottontail rabbits.

WOOD CHARACTERISTICS The wood is heavy, hard and has a close grain, but is not in use commercially.

PRODUCTS

ADDITIONAL COMMENTS Pagoda Dogwoods are ornamental plants that are used as an understory species.

ROUGHLEAF DOGWOOD

(*CORNUS DRUMMONDI*)

HEIGHT/SPREAD/DBH Roughleaf Dogwood grows to a height of 15 - 30' (4.5 - 9.0) and has a mature diameter (DBH) of 6 - 12" (15 - 30 cm).

FORM The plant is grown as a dense, spreading shrub or small tree with a short bole and loose, spreading crown.

FOLIAGE The tree's common name comes from the battered appearance of its yellow-green leaves. Their upper sides have many stiff hairs, and softer hairs cover the undersides.

FLOWER White-petaled flowers are arranged in flat-topped clusters. Each 2 - 3" (5.0 - 7.5 cm) cluster contains many tightly-packed flowers.

FRUIT The fruits are bitter-tasting drupes. Each of the small white fruits contains one or two seeds and reach maturity between August and October.

RANGE Roughleaf Dogwood is a native of the central and southern Great Plains, from Nebraska through Texas.

MOISTURE REQUIREMENTS The species' moisture tolerances range from moist, well-drained soils to very dry conditions, and they are highly tolerant of drought.

GROWTH RATE/LIFESPAN Roughleaf Dogwood is a fast growing plant that lives longer than most *Cornus* species.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM The plant has a dense system of fibrous roots which produce many suckers.

HABITAT *Cornus drummondi* grows along streams and on much drier upland sites to an elevation of 2,000' (610 m).

SOIL REQUIREMENTS The plant grows in all types of soil from clay to rocky soils.

SUN/SHADE Roughleaf Dogwood is an understory plant which grows in deeply shaded hardwood forests.

COMPETITIVENESS The plant's root suckers form dense thickets that crowd out competitors.

WILDLIFE VALUE The fruits are eaten by more than 40 bird species including bobwhite quail, wild turkeys, prairie chickens and songbirds. Smaller birds like Bell's vireo eat the fruit and also use the plant for cover. Roughleaf Dogwood's foliage and twigs are browsed by white-tailed deer.

WOOD CHARACTERISTICS The closed-grained wood is hard and very durable

PRODUCTS Roughleaf Dogwood lumber is used in products like shuttle blocks and charcoal.

ADDITIONAL COMMENTS The plants are used in shelterbelt plantings and along streams where their spreading roots control erosion.

FLOWERING DOGWOOD

(*CORNUS FLORIDA*)

HEIGHT/SPREAD/DBH Flowering Dogwood grows to a full height of 30 - 50' (9 - 15 m) and has a spread equal to or greater than its height. A fully grown specimen has a trunk diameter (DBH) of 8 - 20" (20 - 50 cm).

FORM *Cornus Florida* is grown as a small tree or large shrub and has a flattened outline due to its tiered habit.

FOLIAGE Flowering Dogwood's leaves are glossy with pale undersides and turn reddish purple to red in Autumn. The fallen leaves decompose rapidly.

FLOWER *Cornus florida* is known for its ornamental bracts which are displayed for several weeks in April and May. The bracts surround clusters of many inconspicuous flowers which have tiny yellow petals.

FRUIT The Flowering Dogwood produces clusters of bright red berries that ripen in September and October. The bitter-tasting fruits persist until mid Winter and are poisonous to humans.

RANGE The plant is a native of southeastern Kansas and eastern Oklahoma and Texas. It grows in USDA zones 5 - 9.

MOISTURE REQUIREMENTS The species has midrange soil moisture requirements and grows poorly in soils that are too wet or too dry.

GROWTH RATE/LIFESPAN *Cornus florida* grows at a medium to fast rate.

DISEASES/INSECTS The species is susceptible to diseases such as leaf and petal spots and leaf and stem anthracnose. Borers are its most troublesome insect pests.

OTHER DAMAGING AGENTS In USDA zone 5, Flowering Dogwoods should be selected from cultivars of local or regional provenance for more consistent flowering. The flower buds of plants of southern origin do not survive the Winter temperatures of the central Great Plains.

ROOT SYSTEM

HABITAT The species grows midway between low wetlands and dry upland areas to an elevation of 4,000' (1219 m).

SOIL REQUIREMENTS Flowering Dogwood grows across a broad range of textures and prefers acidic soils.

SUN/SHADE The plant grows in full sun to part shade and often occurs in forest understories.

COMPETITIVENESS The species' competitiveness is demonstrated by its broad dispersal across the fields and ditches of the southern Great Plains.

WILDLIFE VALUE Ripe fruits are quickly consumed by squirrels, raccoons and other small animals, along with 36 species of birds including woodpeckers, grosbeak and thrush. Deer browse the leaves and twigs of the plant.

WOOD CHARACTERISTICS The wood is very hard and heavy, with a close grain and high degree of shock resistance.

PRODUCTS Flowering Dogwood lumber is used to make tool handles, spools and pulleys and occasionally golf club heads.

ADDITIONAL COMMENTS

CORNELIAN CHERRY DOGWOOD

(*CORNUS MAS*)

HEIGHT/SPREAD/DBH Cornelian Cherry Dogwood grows to a height of 15 - 25' (4.5 - 7.5 m), and it has an approximately equal spread.

FORM The plant is grown as a small tree or a large, multi stemmed shrub. It has an oval form with branches extending to near the ground.

FOLIAGE The plant has opposite leaves of medium green and little or no Fall color.

FLOWER *Cornus mas* are one of the earliest flowering shrubs and blooms for three weeks between early February and early April. The attractive yellow flowers are actually bracts which enclose an umbel of inconspicuous flowers. Young specimens produce only male flowers, and female flowers are not produced until the plant is between 10 and 15 years old.

FRUIT The fruits are tiny red drupes that mature between July and September.

RANGE Cornelian Cherry Dogwood is native to Europe and Western Asia and grows in USDA zones 4 - 8.

MOISTURE REQUIREMENTS *Cornus mas* are adaptable to moisture conditions and grow primarily in moist to wet soils as well as drier soils.

GROWTH RATE/LIFESPAN The species has a slow to moderate rate of growth and a long life cycle.

DISEASES/INSECTS Few disease or insect problems are associated with this species.

OTHER DAMAGING AGENTS

ROOT SYSTEM The plant spreads by suckers and may develop into a dense colony.

HABITAT Cornelian Cherry Dogwoods are adaptable to different habitats, but grow best in moist, well-drained soils.

SOIL REQUIREMENTS The shrubs are adaptable to many soils and a wide range of pH levels, however they grow best within a pH range of 6.0 to 7.5.

SUN/SHADE Optimal light conditions for the species are from full sunlight to partial shade.

COMPETITIVENESS The species' adaptability to soils and moisture conditions enhances its competitiveness.

WILDLIFE VALUE

PRODUCTS The fruits which are edible although astringent when raw, were very popular during the late Middle Ages, and are made into jams, jellies and tarts.

ADDITIONAL COMMENTS Cornelian Cherry Dogwood is an ornamental species, with several cultivars are available.

GRAY DOGWOOD

(*CORNUS RACEMOSA*)

HEIGHT/SPREAD/DBH The Gray Dogwood grows to a height of 6 - 15' (2.0 - 4.5 m), and its spread is 6 -10' (2.0 - 3.0 m).

FORM The plant is a multi stemmed shrub which forms a dense colony.

FOLIAGE Dull colored leaves emerge in mid May and fall by mid October. They have little or no Fall color, but their reddish stems are prominent throughout the dormant season.

FLOWER Gray Dogwood is a monoecious species that blooms for one to two weeks between late May and mid June when small white flowers are arranged in 2" (5.0 cm), panicled clusters. Individual clusters appear sporadically, thereafter, until the end of the growing season.

FRUIT The fruits are white drupes which reach maturity between early August and late September and are quickly eaten by birds or animals.

RANGE Gray Dogwood is native to scattered sites across the northern Great Plains from southern Manitoba to northern Nebraska and grows in USDA zones 3a - 8.

MOISTURE REQUIREMENTS The plant grows in poorly drained soils and has intermediate tolerance to flooding. It also resists drought and grows in very dry soils.

GROWTH RATE/LIFESPAN The growth rates of established stems and the plant's newest root suckers differs significantly. The old growth develops slowly, but root suckers grow as much as 6' (2.0 m) in a single season.

DISEASES/INSECTS The plant does not suffer from serious disease or insect problems.

OTHER DAMAGING AGENTS

ROOT SYSTEM Gray Dogwood has a fibrous root system which sends up a multitude of suckers.

HABITAT The shrub grows from wet, lowland areas to dry, upland soils.

SOIL REQUIREMENTS Gray Dogwood is best suited to moderately coarse soils like gravelly loams and adapts to poor soils. The shrub's pH requirements range from 6.1 - 8.5.

SUN/SHADE *Cornus racemosa* grows from full sun to full shade.

COMPETITIVENESS The species is an aggressive competitor which forms dense colonies.

WILDLIFE VALUE Gray Dogwood is a valuable resource to birds. More than 17 species, including flickers, cardinals and eastern bluebirds, eat the sweet-tasting berries which are also eaten by many animals.

PRODUCTS

ADDITIONAL COMMENTS Gray Dogwoods have little ornamental value.

REDTWIG DOGWOOD

(*CORNUS SERICEA*)

HEIGHT/SPREAD/DBH Redtwig Dogwoods grow to a height of 6 - 10' (2 - 3 m), with spreads of 6 - 12' (2 - 4 m). Fully grown specimens have stems with diameters as large as 3" (7.5 cm).

FORM The plant is a large, multi-stemmed shrub that forms a moderately dense thicket.

FOLIAGE The leaves emerge in mid May and mature to an intermediate green with lighter undersides. In the Fall, they turn reddish, orange-red or purple before dropping in late October.

FLOWER Redtwig Dogwood is a monoecious species that blooms between late May and mid June. Individual flower clusters continue to bloom intermittently through the Summer.

FRUIT Whitish drupes are arranged in horizontal clusters and reach maturity between August and late September.

RANGE Redtwig Dogwoods are native to most of the northern half of the Great Plains and grow in USDA zones 2 - 8.

MOISTURE REQUIREMENTS The plants grow in nearly any type of moisture situation. They are highly tolerant of flooding and resist drought, but grow best in moist, well-drained soils.

GROWTH RATE/LIFESPAN *Cornus sericea* is a fast-growing species with a short lifespan.

DISEASES/INSECTS The primary disease and insect problems include leaf spot, powdery mildew, scale and bagworm.

OTHER DAMAGING AGENTS

ROOT SYSTEM The root system is a combination of horizontally inclined, fibrous roots and adventitiously-rooted stolons which, together, provide moderate erosion control.

HABITAT The plant grows from low, wetland areas to higher upland soils between the elevations of 1,476' and 8,858' (450 - 2,700 m).

SOIL REQUIREMENTS *Cornus sericea* grows in a broad range of textures from fine clay to coarse sands and gravel. It resists compaction and grows within a scale of 6.0 - 8.5 on the pH chart.

SUN/SHADE Redtwig Dogwood does not tolerate shade.

COMPETITIVENESS The lower stems bend downward and root horizontally, forming moderately dense colonies.

WILDLIFE VALUE The fruits are eaten by more than 20 bird species including bobwhite quail, grouse and wild turkey. The leaves and twigs are browsed by white-tailed deer, mule deer, rabbits, moose and elk.

PRODUCTS

ADDITIONAL COMMENTS The plant is considered an ornamental species for its bright red stems which provide winter color. Variegated cultivars are widely available.

AMERICAN FILBERT/BEAKED FILBERT

(*CORYLUS AMERICANA/CORYLUS CORNUTA*)

HEIGHT/SPREAD/DBH American Filbert usually grows from 6 - 12' (2 - 4 m) in height. Its spread ranges from 2/3 of the plant's height to much greater than its height. Beaked Filbert's height and spread range between 4 and 8' (1.2 - 2.5 m).

FORM Filberts are dense, multi stemmed shrubs.

FOLIAGE The leaves of both plants emerge in late May and mature to a greenish yellow color. They turn yellow-orange in late Summer before falling by the end of September.

FLOWER Filberts are monoecious plants that bloom in March and April, before their leaves emerge. The male flowers are long yellowish catkins, and the female flowers are red and inconspicuous.

FRUIT The plants produce small clusters of edible nuts which mature between late August and late September. Each nut is tightly held by fleshy bracts that, in the case of *Corylus cornuta*, extend into a long beak which gives the plant its common name.

RANGE American Filbert is an eastern species which is native to the eastern fringe of the Great Plains from northeast Oklahoma to southern Manitoba. It grows in USDA zones 3a - 9. The Beaked Filbert is a northern species which is native to Manitoba and Saskatchewan and scattered sites across the Dakotas. *Corylus cornuta* grows in USDA zones 3a - 8.

MOISTURE REQUIREMENTS The plants have intermediate moisture requirements. They do not tolerate flooding and require moist, well-drained soils. Both species withstand dry conditions and have intermediate tolerance to drought.

GROWTH RATE/LIFESPAN Both Filberts grow at a medium to fast rate and are short-lived.

DISEASES/INSECTS Neither plant is seriously affected by disease nor insects. Their most common problems are leaf spots, crown gall and scales.

OTHER DAMAGING AGENTS

ROOT SYSTEM The shrubs have fibrous root systems with many root suckers.

HABITAT The Beaked Filbert grows along stream banks and hillsides. American Filbert is found in mesic to dry, upland areas.

SOIL REQUIREMENTS Both Filberts have intermediate tolerance to compacted soils and grow from moderately coarse, sandy and gravel soils to fine clay. They have a pH range of 6.1 - 7.5.

SUN/SHADE Both plants are shade tolerant.

COMPETITIVENESS Filberts are aggressively spreading plants that develop into dense colonies, and their seeds are widely distributed by birds and animals.

WILDLIFE VALUE The nuts are a favorite of squirrels and bluejays and they are eaten by many other birds and animals including grouse, quail, chipmunks and ring-necked pheasants. The leaves and twigs are browsed by moose and deer.

PRODUCTS Both plants produce edible nuts.

ADDITIONAL COMMENTS

QUINCE

(*CYDONIA OBLONGA*)

HEIGHT/SPREAD/DBH Quinces are small trees that reach a full height of 12 - 20' (4 - 6 m).

FORM *Cydonia oblonga* is grown as either a small tree or multi stemmed shrubs. It has a broad, umbrella-like form and low, pendulous branches.

FOLIAGE The dark, olive-green leaves have a rounded to oblong shape.

FLOWER Large, solitary, pink or white flowers bloom between early and late Spring on the previous year's growth. Quinces are self-pollinating, but cross pollination is claimed to increase fruit production.

FRUIT Green, aromatic fruits reach maturity between August and October, but should remain on the tree until their color changes to golden yellow or orange between mid October and mid November. They should be cut from the tree to prevent the stems from tearing out the flesh of the fruit.

RANGE Most cultivars grow in USDA zones 6 - 8 and possibly the warmer areas of zone 5. Quince plants require a chilling period of 100 - 450 hours at temperatures below 45° F (7° C) to flower but are severely damaged by cold temperatures of -15° to -20° F (-26° to -29° C). The quince is a native of the Middle East. Certain cultivars are reportedly hardy to USDA zone 4.

MOISTURE REQUIREMENTS The trees require moist soils with the capacity to hold large amounts of water. Quinces are very sensitive to dry conditions and do not tolerate drought.

GROWTH RATE/LIFESPAN The plants have a slow rate of growth.

DISEASES/INSECTS *Cydonia oblonga* is susceptible to the same pests that attack Pear and Apple trees, particularly fire blight and fungal leaf spots. They are also susceptible to oriental fruit moths and codling moths. These insects prefer the fruits of Pear and Apple trees, however, and subsequently attack them more frequently.

OTHER DAMAGING AGENTS Air movement is critical to fruit production. Quinces should not be planted on sites that are exposed to strong winds. Low areas where frost collects should also be avoided. Young specimens have little need for fertilizer and are easily injured or killed by over fertilization.

ROOT SYSTEM Cultivars are usually trained on 'Quince A' rootstocks which are also used as dwarfing rootstocks for pears. Quinces grown on their own root systems tend to sucker heavily.

HABITAT Hillsides are the best sites for Quince, but they must be protected from strong winds while receiving air drainage to flush out late frosts.

SOIL REQUIREMENTS Quinces prefer clay loam. They grow well in many soils, but dry, sandy soil and shallow areas should be avoided. The species tolerates a wide pH range, but grows best in slightly alkaline soil and tends to develop iron-induced chlorosis in highly alkaline soils.

SUN/SHADE The plant requires full sunlight.

COMPETITIVENESS Quinces' slow growth reduces their ability to compete for water and nutrients. Weeds and grasses need to be controlled by mowing or with pesticides or mulch.

WILDLIFE VALUE

WOOD CHARACTERISTICS

PRODUCTS The fruits have a high pectin content and should be cooked or baked instead of eaten raw. Quinces are made into aromatic, orange-honey colored, jellies, jams, marmalade and wine. They can also be used in much the same way as apples for baking and deserts.

ADDITIONAL COMMENTS Quinces have been cultivated for thousands of years, but today they are rarely grown, and a potential specialty crop market exists. Quinces are also ornamental plants that are used as specimen plantings.

RUSSIAN-OLIVE
(*ELAEAGNUS ANGUSTIFOLIA*)

HEIGHT/SPREAD/DBH Russian-Olive grows to a height of 20 to 30' (6 - 9 m). The plant's spread is approximately equal with its height.

FORM The plant is usually a small tree, but it can be trained as a large shrub. The crown is densely tangled, with branches growing low to the ground. The bole of the tree is often crooked or leaning.

FOLIAGE The tree is easily recognized by the silvery-gray undersides of its leaves which have several to many brown dots. The tops of the willow-like leaves are dull green.

FLOWER The plant produces perfect, bell-shaped flowers which bloom from late Spring to early Summer. The tiny, inconspicuous flowers are very fragrant.

FRUIT The pollinated flowers develop into yellow-brown fruits covered with scales that ripen during August and September. The sweet-tasting, fruit is an achene with a fleshy perianth.

RANGE Russian-Olive is a plant that was introduced from Europe and Asia and has naturalized across the northern United States. It grows in USDA zones 2 - 7.

MOISTURE REQUIREMENTS *Elaeagnus angustifolia* grows in moist to dry soils. The plant is very drought tolerant and grows best in drier climates.

GROWTH RATE/LIFESPAN Russian-Olive grows at a medium to fast rate.

DISEASES/INSECTS Verticillium wilt is the most serious disease problem. Other problems include leaf spots, aphids and scales.

OTHER DAMAGING AGENTS

ROOT SYSTEM The plant has a fibrous root system which produces root suckers.

HABITAT Russian-Olive will grow nearly anywhere and is found along streams, on hillsides, in ditches and fence lines. It grows to an elevation of 5,000' (1,524 m).

SOIL REQUIREMENTS The plant prefers sandy loam but grows in most soils. Russian-Olive has a high tolerance to alkaline soil.

SUN/SHADE The plant grows best in full sun.

COMPETITIVENESS Russian-Olive is a highly invasive species whose seed is widely dispersed by birds.

WILDLIFE VALUE The fruits are eaten by many birds including ring-necked pheasants, sharp-tailed grouse, cedar waxwings and grosbeaks.

WOOD CHARACTERISTICS

PRODUCTS

ADDITIONAL COMMENTS Russian-Olive is a nitrogen-fixing plant whose edible fruits are made into jelly and deserts.

SILVERBERRY

(*ELAEAGNUS COMMUTATA*)

HEIGHT/SPREAD/DBH Silverberry grows to a full height of 6 - 12' (2 - 4 m) and its spread is roughly 2/3 of the plant's height.

FORM Silverberry's lower branches are recumbent, and the lowest grow along the ground. The remaining branches are upright and the plant's form is broadest at the top.

FOLIAGE Bright gray leaves covered with silvery scales emerge in late May. They turn greenish before falling in late November.

FLOWER Silverberry is a monoecious plant that blooms from mid June to early July. The tiny, bell-shaped flowers are very fragrant.

FRUIT Silvery-gray drupes, covered with scales, ripen between late August and late October.

RANGE Silverberry is a northern species that is native to Manitoba and Saskatchewan and portions of Montana and the Dakotas. It grows in USDA zones 2 - 5.

MOISTURE REQUIREMENTS Silverberrys are very intolerant of flooding. They grow best in dry soils, but their tolerance to drought is merely intermediate.

GROWTH RATE/LIFESPAN The species is long-lived and fast growing.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM The plant has a system of shallow, fibrous roots and it spreads by adventitiously rooted stolons.

HABITAT The plant is found on drier, upland sites and in lowland areas along streams and rivers.

SOIL REQUIREMENTS Silverberry grows in soil textures ranging from coarse sands and gravel to fine clay, and it has a pH range of 6.1 - 8.5.

SUN/SHADE The plant is intolerant of shade.

COMPETITIVENESS *Elaeagnus commutata* is an invasive species which forms colonies of adventitiously rooted suckers.

WILDLIFE VALUE The fruits are eaten by rabbits and several birds including ring-necked pheasants and prairie chickens. Animals browse the leaves and twigs of the plants, and livestock eat the fruits.

PRODUCTS

ADDITIONAL COMMENTS Silverberry is a nitrogen-fixing species.

AUTUMN-OLIVE

(*ELAEAGNUS UMBELLATA*)

HEIGHT/SPREAD/DBH Autumn-Olive grows to a height of 12 to 18' (3.6 - 5.4 m). The plant's spread is roughly equal to or in excess of its height.

FORM *Elaeagnus umbellata* is a broadly spreading shrub.

FOLIAGE The leaves are bright green on top with silvery scales. Their undersides are pale and covered with brown scales.

FLOWER Silvery-white flowers bloom between May and June. The tiny, fragrant flowers are funnel-shaped.

FRUIT Immature fruits are silver colored and partially covered with brown scales. The rounded fruits turn red when they ripen between September and October.

RANGE The shrub is a native of eastern Asia that has adapted to large portions of the United States. Autumn-Olive grows in USDA zones 3 - 8.

MOISTURE REQUIREMENTS The plant is noted for its high degree of drought resistance. It grows best in moist, well drained, soils.

GROWTH RATE/LIFESPAN

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT

SOIL REQUIREMENTS The plant grows under most conditions and is highly tolerant of saline soils, low pH and drought.

SUN/SHADE The plant does well in lightly shaded areas.

COMPETITIVENESS Autumn-Olive is an invasive species that is spread by birds.

WILDLIFE VALUE The fruits are eaten by a number of bird species.

WOOD CHARACTERISTICS

PRODUCTS Autumn-Olive is useful in honey production because its flowers are highly attractive to bees.

ADDITIONAL COMMENTS Autumn-Olive fixes atmospheric nitrogen. "Cardinal" is a Soil Conservation Service introduction which grows in very poor soil conditions.

POSSUM HAW

(*ILEX DECIDUA*)

HEIGHT/SPREAD/DBH Possum Haw grows to a full height of 12 - 20' (4 - 6 m), and its spread is roughly equal to 3/4 of its height. A fully grown specimen's stem diameter is as large as 6" (15 cm).

FORM *Ilex decidua* is grown as either a small tree or a large shrub which develops into a dense colony of suckers.

FOLIAGE The leaves emerge in mid May and mature to a dark green over Summer. The foliage turns yellow in the Fall and persists until January.

FLOWER The plant is dioecious, and it produces small clusters of green to white flowers that bloom from late May to mid June.

FRUIT The fruits are red or orange berries which mature in September and persist through Winter. The berries are poisonous to humans and they are solitary or arranged in clusters of 2 - 5.

RANGE Possum Haw is native to a portion of the southern Great Plains from eastern Kansas to the Gulf Coast. It grows in USDA zones 5b - 9.

MOISTURE REQUIREMENTS The plant's moisture specifications are wide ranging. Possum Haw is highly tolerant of flooding and grows in soils with very poor drainage. It also grows in very dry soils and is resistant to drought.

GROWTH RATE/LIFESPAN *Ilex decidua* is a slow growing plant with a long life span.

DISEASES/INSECTS The plant has few insect or disease problems. Occasional problems such as powdery mildew, leaf spots and leaf miners can occur.

OTHER DAMAGING AGENTS Strong Winter storms can strip the leaves and bark from the plant but do little to damage its structure.

ROOT SYSTEM The plant has a fibrous, lateral root system that produces many suckers.

HABITAT The plant occurs most frequently on wet lowland sites along streams and ponds. Possum Haw is also found in upland areas, and grows to an elevation of 1,200' (366 m).

SOIL REQUIREMENTS *Ilex decidua* is resistant to compaction, and it grows in any soil texture. The plant prefers a pH of 4.0 to 6.0, but tolerates alkaline soils with pH's as high as 8.5.

SUN/SHADE The plant grows in full Sun to light shade.

COMPETITIVENESS Possum Haw forms dense thickets of suckers.

WILDLIFE VALUE The persistent fruits of *Ilex decidua* are eaten by opossums and raccoons and many bird species including turkey, quail, eastern bluebirds, robins and purple finch. The leaves and twigs of the plant are browsed by deer.

WOOD CHARACTERISTICS Possum Haw wood is light colored and hard and dense, but it is not used commercially due to its limited availability.

PRODUCTS Possum Haw branches bearing persistent fruits are used as Christmas decorations.

ADDITIONAL COMMENTS Several ornamental cultivars of *Ilex decidua* are available.

MEDLAR

(*MESPILUS GERMANICA*)

HEIGHT/SPREAD/DBH Medlars reach a maximum height of 20' (6 m).

FORM The plant is grown as a shrub or a half standard and it has a rounded form with a dense branch structure.

FOLIAGE The dull colored leaves turn an attractive reddish yellow in Autumn.

FLOWER White to pinkish flowers bloom in May or June. The five-petaled flowers are self-fertile and have distinctive, triangular sepals which extend beyond the petals.

FRUIT The brown, 1" (2.5 cm) fruits are hard pomes topped with a broad, hairy protrusion. They mature by mid-Autumn, but should remain on the tree until after the first hard frost. The fruits are very hard and bitter-tasting when they are picked in late October to early November, and they require several weeks of cool storage to soften the fruit and sweeten their taste.

RANGE The species is originally native to the Middle East and grows in USDA zones 5 - 8. They require 100 - 450 hours of cold treatment each Winter at temperatures below 45° F (7° C) in order to flower.

MOISTURE REQUIREMENTS Moist, well-drained soil is necessary to grow Medlars.

GROWTH RATE/LIFESPAN The species grows at a slow rate.

DISEASES/INSECTS The pests most likely to affect Medlars are leaf-eating caterpillars and fungal leaf spots. They are slightly susceptible to rust.

OTHER DAMAGING AGENTS

ROOT SYSTEM Medlar cultivars are usually grafted on "Quince A" rootstocks. One author recommends planting the graft union below the surface to allow the scion to develop its own root system.

HABITAT The plants require shelter from strong winds and do not grow in wet soils.

SOIL REQUIREMENTS Medlars grow well in most soils except those which are highly alkaline.

SUN/SHADE The plants perform best in full sunlight, but they also grow in light shade.

COMPETITIVENESS

WILDLIFE VALUE

WOOD CHARACTERISTICS

PRODUCTS The fruits are used to make distinctively-flavored, orange-colored jellies and preserves. Medlars can also be used in puddings and sorbets.

ADDITIONAL COMMENTS Cultivars with fruits as large as 2" (5 cm) in diameter are available. Medlars have been cultivated for several thousand years and formerly were very popular. Today, they are seldom grown, however, and a potential market for the crop exists.

NINEBARK

(*PHYSOCARPUS OPULIFOLIUS*)

HEIGHT/SPREAD/DBH Ninebark grows to a height of 5 - 12' (1.5 - 3.5 m) and spreads across the same approximate distance.

FORM *Physocarpus opulifolius* is a very dense shrub with a rounded outline and arching branches.

FOLIAGE Three-lobed leaves emerge in early May and their color is light yellow-green. In the Fall, they turn yellow or reddish purple before dropping in late October.

FLOWER Ninebark is a monoecious plant whose fragrant, pinkish-white flowers bloom between late May and early July. The species is sometimes grown for its floral display.

FRUIT The fruits are 4-part capsules which are borne in dense clusters. The capsules are red to pink at maturity, in early Fall, and turn brown over Winter.

RANGE The plant is a native of several widely scattered sites across the central Great Plains and grows in USDA zones 2 - 7.

MOISTURE REQUIREMENTS The plant is very tolerant of flooding and grows in wet, poorly drained soils. Ninebark is also resistant to drought and tolerates dry, excessively drained soils.

GROWTH RATE/LIFESPAN *Physocarpus opulifolius* grow at a medium to fast rate and are short lived.

DISEASES/INSECTS The species does not have any serious disease or insect problems.

OTHER DAMAGING AGENTS

ROOT SYSTEM The root system consists of fibrous, lateral roots.

HABITAT Ninebark is found in wet lowland areas along streams and rivers and on dry upland sites.

SOIL REQUIREMENTS Ninebark is resistant to compaction and grows in soil textures ranging from moderately coarse loams to fine clay. The plant has a broad pH range of 6.1 - 8.5.

SUN/SHADE The plant does not tolerate shaded conditions.

COMPETITIVENESS Ninebark is a tough plant which grows in poor soil conditions.

WILDLIFE VALUE The fruits are eaten by several bird species. Smaller birds, such as the American Goldfinch, nest in the dense foliage.

PRODUCTS

ADDITIONAL COMMENTS

AMERICAN PLUM

(*PRUNUS AMERICANA*)

HEIGHT/SPREAD/DBH *Prunus americana* has a height and spread of 15 to 35' (4.5 - 10.0 m). A fully grown plant has a diameter (DBH) of approximately 1' (0.3 m).

FORM American Plum is grown as a small tree with one to several stems or a large, multi-stemmed shrub that develops into a dense colony.

FOLIAGE Dark green foliage emerges in late May and turns light golden-yellow in the Fall. The leaves drop in early Autumn.

FLOWER American Plum is a monoecious species which produces clusters of strongly scented, white flowers. The flowering periods of neighboring colonies may differ greatly. Each blooms for one to two weeks between early March and mid May.

FRUIT The fruits are large red to yellow berries that mature between June and early September. The sweet-tasting fruits are arranged in clusters of 1 - 4 fruits.

RANGE American Plum is a native plant across a wide swath of the Great Plains, from east Montana and the Dakotas to northeastern Oklahoma. It grows in USDA zones 3a - 9.

MOISTURE REQUIREMENTS The plant is intolerant of flooding and grows in moisture situations ranging from moderately well drained soils to drought conditions.

GROWTH RATE/LIFESPAN The species is fast growing and lives from 35 to 65 years.

DISEASES/INSECTS American Plums have greater disease and insect resistance than other *Prunus* species and are generally free of problems.

OTHER DAMAGING AGENTS

ROOT SYSTEM The root system consists of shallow, fibrous roots which produce multiple suckers.

HABITAT *Prunus americana* grows wild in dry, upland areas to an elevation of 6,000' (1,829 m).

SOIL REQUIREMENTS The plant grows best in deep loamy soils which range in texture from fine to moderately coarse. *Prunus americana* is sensitive to compacted soils and requires a pH of 6.5 to 7.5.

SUN/SHADE American Plum is intolerant of shade.

COMPETITIVENESS *Prunus americana* is an aggressively spreading species which quickly develops into a colony via suckering.

WILDLIFE VALUE The fruits are eaten by raccoons, squirrels, bears, foxes and many birds including ring-necked pheasants, grouse, bobwhites, robins and woodpeckers. In the Fall, the wilted leaves of the plant contain hydrocyanic acid which is poisonous to livestock.

WOOD CHARACTERISTICS The wood is not used commercially, due to limited availability.

PRODUCTS The fruits are very sweet and eaten raw or used for baking and jellies.

ADDITIONAL COMMENTS American Plum is widely used for erosion control. "Inch Plum" (*P. americana*, v. *lanatana*) is a cultivar selected for the southern Great Plains.

CHICKASAW PLUM

(*PRUNUS ANGUSTIFOLIA*)

HEIGHT/SPREAD/DBH Chickasaw Plum grows to a full height of 5 - 25' (1.5 - 8.0 m) with a spread which is approximately equal with its height. The diameter (DBH) of a fully grown plant extends to 8" (20 cm).

FORM The plant is grown as a small tree or large shrub. It has a dense form and an irregular branching pattern.

FOLIAGE The alternate leaves are glossy on top and pale on their undersides.

FLOWER Perfect white flowers, arranged in clusters of 2 - 4 flowers, bloom between March and May.

FRUIT The fruit is a small drupe that matures between June and August. The yellow to bright red fruit has a large endocarp and its taste is slightly tart.

RANGE Chickasaw Plum is native to much of Kansas and Oklahoma and the east and northern sections of Texas.

MOISTURE REQUIREMENTS The plant grows in soils ranging from moderately well drained to dry.

GROWTH RATE/LIFESPAN *Prunus angustifolia* is a fast growing plant that has a short life span. It grows as far north as Zone 6.

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM The plant's fibrous root system produces masses of root suckers.

HABITAT Chickasaw Plum grows along streams as well as pastures and fence lines to an elevation of 3,000' (914 m).

SOIL REQUIREMENTS The plant grows in soils ranging in texture from coarse to medium and prefers loamy soils.

SUN/SHADE Partial shade provides the best growing conditions for Chickasaw Plum.

COMPETITIVENESS Chickasaw Plum spreads aggressively, forming thick colonies of root suckers.

WILDLIFE VALUE The fruits are eaten by robins and mockingbirds in addition to bears, raccoons and squirrels. In Autumn, the wilted leaves contain hydrocyanic acid which is poisonous to livestock.

WOOD CHARACTERISTICS The reddish wood is soft and weak despite its relatively high density and it is not used commercially.

PRODUCTS The fruits are eaten raw or used to make jellies.

ADDITIONAL COMMENTS The plant is planted in shelterbelts and it is very useful for erosion control.

WESTERN SANDCHERRY

(PRUNUS BESSEYI)

HEIGHT/SPREAD/DBH *Prunus besseyi* has a height and spread of 4 - 6' (1.2 - 2.0 m).

FORM Western Sandcherry is a low-growing shrub which spreads by suckering.

FOLIAGE The grayish green leaves of the plant are long [1.0 - 2.5", (2.5 - 7.5 cm)] and narrow.

FLOWER Small white flowers bloom in April or May.

FRUIT The fruits, which ripen during July and August, are purplish black drupes.

RANGE *Prunus besseyi* is an introduced species that has naturalized over the north half of the western Great Plains from Manitoba to Kansas and grows in USDA zones 3 - 6.

MOISTURE REQUIREMENTS The plant grows in conditions ranging from moist soils with average drainage to dry, excessively drained soils.

GROWTH RATE/LIFESPAN

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM The plant spreads by root suckers and has a shallow, fibrous root system.

HABITAT Western Sandcherry prefers moist, lowland soils but tolerates drier, upland soils.

SOIL REQUIREMENTS The shrub grows from coarse, rocky soils to medium textured loams.

SUN/SHADE Full sun is required by the plant.

COMPETITIVENESS The species spreads via root suckers but it does not form exceedingly dense thickets like other suckering plants.

WILDLIFE VALUE Ring-necked pheasants and other birds eat the fruits, and the shrub is also useful for nesting cover. The entire plant is poisonous to livestock.

PRODUCTS

ADDITIONAL COMMENTS

NANKING CHERRY

(*PRUNUS TOMENTOSA*)

HEIGHT/SPREAD/DBH *Prunus tomentosa* grows from 6 - 10' (2.0 - 3.1 m) in height and has a spread of 8 - 15' (2.3 - 5.0 m).

FORM The plant has a dense, rounded form that broadens and becomes thinner with age.

FOLIAGE The genus takes its name from the many hairs (tomentose) which cover the undersides of its leaves.

FLOWER Nanking Cherry is one of the earliest *Prunus* species in flower each Spring. The fragrant, white-petaled flowers bloom in April on pinkish buds.

FRUIT The fruits are dark red, edible berries which mature in June and July.

RANGE The plant was introduced from Asia and grows in USDA zones 2 - 7.

MOISTURE REQUIREMENTS

GROWTH RATE/LIFESPAN

DISEASES/INSECTS

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT

SOIL REQUIREMENTS

SUN/SHADE

COMPETITIVENESS

WILDLIFE VALUE The fruits are eaten by many bird species including blue jays, woodpeckers, robins and cardinals. During Autumn, the wilted leaves contain hydrocyanic acid which is poisonous to livestock.

WOOD CHARACTERISTICS The wood is not used commercially.

PRODUCTS The fruits are used in jellies and wine.

ADDITIONAL COMMENTS *Prunus tomentosa* is planted for its ornamental flowers.

CHOKECHERRY

(*PRUNUS VIRGINIANA*)

HEIGHT/SPREAD/DBH *Prunus virginiana* grows 20 - 30' (6 - 9 m) in height and has a spread of 18 - 25' (5.4 - 7.5 m). A fully grown plant has a diameter (DBH) of approximately 8" (20 cm).

FORM Chokecherry is grown as either a small tree with a crooked trunk or a large and unruly shrub with multiple-stems.

FOLIAGE The leaves that emerge in early May are light green with a reddish tinge. They mature to a dark glossy green and later turn yellowish orange before dropping in mid October.

FLOWER The tree bears elongated clusters of perfect, white-petaled flowers which bloom in late April or May.

FRUIT The common name of the plant is derived from the astringence of its immature fruits. The red, black or yellow berries are thick skinned and have poisonous endocarps. They ripen between August and mid September, losing some of their bitter taste with maturity.

RANGE *Prunus virginiana* has a very broad range and is native to nearly all of the northern and central Great Plains. It grows in USDA zones 2 - 6.

MOISTURE REQUIREMENTS Chokecherry grows in moist to dry soils and resists drought. It is intolerant of flooding.

GROWTH RATE/LIFESPAN The plant grows at a rate of 2 - 3' (0.6 - 0.9 m) per year, and its lifespan is short to medium length.

DISEASES/INSECTS The most frequent disease problem is black knot disease which causes twig dieback.

OTHER DAMAGING AGENTS Accumulations of ice are likely to cause the branches to break.

ROOT SYSTEM The root system is composed of suckering fibrous roots.

HABITAT Chokecherry is found along slopes and in dry upland areas to an elevation of 8,000' (2,438 m).

SOIL REQUIREMENTS *Prunus virginiana* is sensitive to compaction and grows in a variety of loamy soils with moderately coarse to moderately fine textures. It requires a pH level between 6.5 and 7.5.

SUN/SHADE The plant grows best in full Sun.

COMPETITIVENESS Chokecherry forms dense colonies of root suckers and is widely dispersed by birds.

WILDLIFE VALUE Chokecherries are eaten by more than 40 bird species including eastern bluebirds, grouse, prairie-chickens, pheasant and quail. The leaves and twigs are browsed by white-tail deer. In the Fall, the wilted leaves contain hydrocyanic acid which is poisonous to livestock.

WOOD CHARACTERISTICS The closely grained, light brown wood is weak despite its hardness and high density and it is not used commercially.

PRODUCTS Chokecherries are used to make wine, jelly and baked goods.

EUROPEAN BUCKTHORN

(*RHAMNUS CATHARTICA*)

HEIGHT/SPREAD/DBH European Buckthorn has a full height and spread of 20 - 25' (6.0 - 7.5 m).

FORM The plant is grown as either a large shrub or a small tree whose lowest branches are near the ground.

FOLIAGE During Summer, the leaves are dark and ornamental, but their Fall appearance is undistinguished. European Buckthorn is readily differentiated from native Buckthorns by the sharp margin of its leaves.

FLOWER European Buckthorn is a dioecious plant which has sparsely arranged clusters of tiny, bell-shaped flowers. The greenish-yellow flowers bloom in late Spring.

FRUIT The fruits are bitter-tasting drupes that were used in the past as a cathartic, giving the plant its Latin name. The black fruits mature in late Summer and early Autumn.

RANGE *Rhamnus cathartica* was introduced from Europe and Asia and has naturalized across much of the eastern United States. Within the Great Plains, it has adapted to an area extending from Kansas to North Dakota and grows in USDA zones 2 - 7.

MOISTURE REQUIREMENTS The moisture range of the plant stretches from wet to dry soils.

GROWTH RATE/LIFESPAN The species grows at a medium to fast rate.

DISEASES/INSECTS European Buckthorn is an alternate host to oat leaf rust fungi and is subject to diseases such as leaf spot and powdery mildew. It is resistant to insects, however.

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT

SOIL REQUIREMENTS The plant is usually found in areas with dry soils such as pastures, fence lines and ditches.

SUN/SHADE *Rhamnus cathartica* grows in full sun to light shade.

COMPETITIVENESS The species is widely dispersed by birds and considered a noxious weed by many states.

WILDLIFE VALUE More than 15 species of birds eat the fruits.

PRODUCTS

ADDITIONAL COMMENTS *Rhamnus cathartica* is a hardy plant that can be used in areas where other plants are difficult to grow.

FRAGRANT SUMAC

(*RHUS AROMATICA*)

HEIGHT/SPREAD/DBH Fragrant Sumac grows to a height of 6 - 12' (2 - 4 m) with a spread of 12 - 20' (4 - 6 m).

FORM The plant has crooked branches and an erratic growth habit, but usually it's a mounded, low growing shrub.

FOLIAGE Attractive, trifoliate leaves emerge in mid May and mature to a bright green. Their fall color ranges from orange to purple and is best in light soils. The leaves, which fall in late November, has a pungent odor when crushed.

FLOWER *Rhus aromatica* may be either polygamous or dioecious. Male flowers are 1" (2.5 cm) catkins and the yellow, female flowers are arranged on short panicles. They bloom from mid March to April.

FRUIT Female plants produce dense clusters of dark red berries that reach maturity between mid July and September. The fruits persist until the following Spring.

RANGE The plant is a native of the southern Great Plains whose range extends over much of Kansas, Oklahoma and northern Texas. *Rhus aromatica* grows in USDA zones 3 - 9.

MOISTURE REQUIREMENTS Fragrant Sumac is intolerant of flooding and grows in soils that range from moist and well drained to droughty.

GROWTH RATE/LIFESPAN The plant grows at a slow to a medium pace and has a short lifespan.

DISEASES/INSECTS *Rhus aromatica*'s disease and insect problems include leaf spots, powdery mildew, scale and aphids, none of which inflict serious damage on the species.

OTHER DAMAGING AGENTS

ROOT SYSTEM The root system is made up of shallow, fibrous roots. The outer branches of the plant lay along the ground and initiate adventitious rooting.

HABITAT The plant is found in dry upland areas.

SOIL REQUIREMENTS *Rhus aromatica* grows in coarsely textured, sandy or rocky soils and is sensitive to compaction. Its pH requirements range from 6.1 - 8.5.

SUN/SHADE The plant does not tolerate shade.

COMPETITIVENESS Dense colonies of suckers eventually develop, due to the species' adventitious rooting habit.

WILDLIFE VALUE The fruits are eaten by more than 25 bird species including robins, grosbeaks, bobwhites, sage hens and pheasants. The plant is browsed by mountain sheep and deer.

PRODUCTS The stems are used in basket weaving.

ADDITIONAL COMMENTS Fragrant Sumac is a good choice for erosion control on upland hillsides and is used as an ornament selection in naturalized settings.

SHINING SUMAC

(RHUS COPPALINA)

HEIGHT/SPREAD/DBH Shining Sumac's height and spread ranges from 25 - 30' (7.5 - 9.0 m). The diameter (DBH) of a full-grown plant is approximately 6" (15 cm).

FORM Shining Sumacs are grown as large shrubs or small trees. The crown of the plant is open and much broader at the top.

FOLIAGE Pinnately compound leaves emerge in late May. The leaves' Autumn color varies from light to dark red before they drop in October.

FLOWER *Rhus copallina* is polygamo-dioecious and produces densely hairy, upright clusters of greenish white flowers. They bloom in July and August and are arranged in clusters up to 8" (20 cm) in length.

FRUIT Dark red drupes reach maturity in September or October and persist through Winter. The one-seeded fruits are pubescent and arranged in dense, upright clusters.

RANGE Shining Sumac is native to the eastern border of the Great Plains from southeast Nebraska to northeastern Texas and grows in USDA zones 4 - 9.

MOISTURE REQUIREMENTS *Rhus copallina* does not tolerate flooding and performs best in soils with average moisture. It also grows in dry soils and is tolerant of drought.

GROWTH RATE/LIFESPAN Shining Sumac is a fast growing plant with a short lifespan that rarely exceeds 50 years.

DISEASES/INSECTS There are very few diseases or insect problems associated with the species.

OTHER DAMAGING AGENTS Strong winds easily uproot Shining Sumacs because of their shallow roots.

ROOT SYSTEM The plant has a very shallow root system composed of fibrous roots. Many suckers grow from these wide spreading roots, allowing a plant to expand into a dense colony.

HABITAT *Rhus copallina* is found primarily in upland areas such as prairies and along the edges of woodlands. It grows to an elevation of 4,500' (1,372 m).

SOIL REQUIREMENTS Shining Sumacs grow in most soil types, and require a pH level between 6.1 - 7.0. They are sensitive to soil compaction.

SUN/SHADE *Rhus copallina* grows in full Sun to light shade.

COMPETITIVENESS The plants grow quickly and establish dense colonies of root suckers.

WILDLIFE VALUE More than 20 species of birds, including bobwhites, grouse and ring-necked pheasants eat the fruits. The plant is browsed by deer and rabbits.

WOOD CHARACTERISTICS The light colored wood is soft and has a coarse texture.

PRODUCTS The stouter portion of the limb is used locally for fence posts.

ADDITIONAL COMMENTS

WILLOW SPECIES (SHRUB-FORM)

BEBB WILLOW (*SALIX BEBBIANA*)

PUSSY WILLOW (*S. DISCOLOR*)

SANDBAR WILLOW (*S. EXIGUA*)

SLENDER WILLOW (*S. PETIOLARIS*)

HEIGHT/SPREAD/DBH Bebb Willow is either a large shrub which grows up to 15' (5 m), or a tree as tall as 30' (10 m). A Bebb Willow tree has a narrow spread of 10 - 15' (3.1 - 5.0 m). Sandbar Willow is smaller, ranging in height from 3 - 12' (1 - 4 m) as a shrub and 20 - 25' (6.6 - 8.3 m) as a tree. Pussy Willow is usually a large shrub of 6 - 12' (2 - 4 m), but it has the potential to grow 20 - 35' (6.6 - 11.6 m). In most of the Great Plains, Slender Willow is a shrub that grows as large as 10' (3.3 m), but in Canada, it may grow into a tree as tall as 23' (7.6 m). Trunk diameters (DBH's) are 6 - 8" (15 - 20 cm) on Pussy Willow and Sandbar Willow and up to 12" (30 cm) on Bebb Willow.

FORM Shrub Willows are usually dense, multi stemmed plants, but as trees, they have short trunks and upright habits that become rounded as the plants mature.

FOLIAGE Willows usually have long, narrow leaves that vary in width between species. They emerge by early April in most areas, and their color ranges from a light yellow green to bluish green, although the Bebb Willow's emergent leaves are silvery gray. The colors of the tops and undersides of the leaves often contrast, due to coatings of fine hairs.

FLOWER *Salix* is a dioecious genus whose often showy catkins are an early sign of Spring. While they are all early flowering species, the bloom periods of shrub-form Willows vary greatly in reference to the emergence of their leaves. Pussy Willow blooms between the end of February and May, well before its leaves appear. Bebb and Slender Willows flower near the time of leaf emergence, which occurs between April and June. Sandbar Willows' catkins bloom as their leaves reach maturity in April or May, and secondary flowering continues well into the Summer.

FRUIT The fruits are capsules that mature in Spring or early Summer, approximately a month after pollination. Each greenish brown capsule holds many tiny seeds with tufts of silky hairs.

RANGE The Willows covered here are primarily northern species. They're hardy to USDA zone 2, and have broad native ranges that extend over most of Canada as well as the northern half of the American Great Plains. Sandbar and Bebb Willow are adaptable to warmer climates and grow throughout the southern Great Plains.

MOISTURE REQUIREMENTS Shrub Willows are extremely tolerant of flooding and grow in wet to moist soils with very poor drainage. All of the species, with the exception of Slender Willow, also tolerate drought, and grow in relatively dry conditions.

GROWTH RATE/LIFESPAN All shrub Willows grow quickly, and their lifespans are quite short. They grow up to 6' (2 m) in a single season and reach maturity within 20 - 25 years. Shrub Willows rarely live past age 50.

DISEASES/INSECTS Willows are frequently attacked by diseases and insects. Common Willow diseases include twig and leaf blights, cankers and powdery mildew. Insect pests include aphids, willow borers, scale, willow lacebug and several types of galls.

OTHER DAMAGING AGENTS Wind, snow and ice easily damage the plants. Whole stems frequently break off, due to the weakness of the wood.

ROOT SYSTEM Willows have shallow, fibrous root systems that form dense thickets. They hold erodible soils in place while slower-growing, associated species establish themselves.

HABITAT All shrub Willows grow on wet, lowland sites, and several, like Sandbar Willow and Slender Willow, may be planted in the shallow areas of a stream. Many of these same species also grow on much drier, upland sites. Bebb Willow grows at elevations as high as 11,000' (3,353 m) and is recommended for riparian plantings at high elevations. Sandbar Willow often occurs in dry grasslands and wooded areas between 4,000 - 9,500' (1,219 - 2,895 m). Pussy Willow is found on low, wet sites below 4,000' (1,219 m).

SOIL REQUIREMENTS The plants grow in any type of soil with a pH level near 7.0. They resist compaction and grow best in the rich, alluvial soils that occur along streams.

SUN/SHADE Willows do not tolerate shade.

COMPETITIVENESS Willows are pioneering species that quickly inhabit empty sites with adequate supplies of moisture, and they grow in pure stands or in association with other Willows. They also grow in association with Cottonwoods and Silver Maples which eventually succeed them, due to the Willows' intolerance to shade.

WILDLIFE VALUE Willows are very important to wildlife. They provide dense cover and nesting sites, and many portions of the plant are eaten, especially in early Spring. The buds, inner bark, shoots and soft woody tissues of the plants are eaten by birds such as the ruffed grouse, and small animals like cottontail rabbits, beavers and squirrels. Willows are heavily browsed by deer and livestock, which keeps their size in check.

WOOD CHARACTERISTICS In general, the wood is very weak and it has little commercial value. Some, like Bebb Willow, however, may have diamond-shaped depressions on the outer wood which is caused by a fungus that occurs on trees grown on poor or shaded sites. The outer wood of these trees is marketed as "Diamond Willow," which is used in a variety of products.

PRODUCTS Diamond Willow is used to produce furniture, bats, lamp posts and canes. The twigs of several shrub Willows are used to make baskets, and stems cut from Pussy Willow are widely used in the floral industry.

ADDITIONAL COMMENTS Several Willow shrubs such as Pussy Willow and Slender Willow are highly ornamental, and are grown for their early season floral display.

ELDERBERRY
(*SAMBUCUS CANADENSIS*)

HEIGHT/SPREAD/DBH Elderberries generally reach a full height and spread of 6 - 12' (2 - 4 m). In Texas, however, they grow as tall as 30' (10 m).

FORM *Sambucus canadensis* is either a shrub or a small tree. Both have a rounded outline, and the shrub-form has many upright stems.

FOLIAGE Glossy leaves with pale undersides emerge in early May. The pinnately compound leaves turn yellow green in the Fall before they drop in November.

FLOWER Large, flattened clusters of white flowers bloom between May and the middle of July, and individual clusters continue to appear throughout the growing season. The species is monoecious and its star-shaped flowers may be heavily scented.

FRUIT Drooping clusters of bittersweet, dark-colored berries reach maturity between early August and early October. The species' late flowering period usually ensures a large crop.

RANGE Elderberries are native to the eastern half of the central and southern Great Plains and grow in USDA zones 3a to 9.

MOISTURE REQUIREMENTS The species grows from wet soils that are often flooded to excessively dry sites.

GROWTH RATE/LIFESPAN Elderberries develop very quickly and their lifecycle is short. New stems grow as much as 15' (5 m) in a single season and the species is capable of producing fruit within four years of planting their seed.

DISEASES/INSECTS Disease occurrences are more common to Elderberries than insect problems. The most likely diseases include cankers, leaf spots, verticillium wilt and powdery mildew. Insect species which attack the plants include borers and thrips.

OTHER DAMAGING AGENTS Stem damage is common because of their large quantity of pith.

ROOT SYSTEM The root system consists of fibrous roots that send up masses of suckers which are easily transplanted.

HABITAT Elderberries grow nearly anywhere, but are more common in the moist to wet soils along streams. The plants grow to an elevation of 5,000' (1,500 m) on native sites.

SOIL REQUIREMENTS The plants grow in every soil texture, from coarse sands and gravel to finely-textured clays and muck. They do well in acid or alkaline soils, but prefer a pH level between 6.1 and 7.5

SUN/SHADE Elderberries are very shade tolerant.

COMPETITIVENESS The species' dense habit, fast growth and their abundance on disturbed sites indicate a high degree of competitiveness.

WILDLIFE VALUE Elderberries are a highly valuable wildlife resource. The fruits are eaten by nearly 50 bird species including cardinals, robins, woodpeckers and eastern bluebirds. Elderberries are especially important to gallinaceous species such as quail, prairie chickens and ring necked pheasants, and they are eaten by rodents like the red squirrel. The leaves and twigs of the plant are browsed by white-tailed deer.

WOOD CHARACTERISTICS

PRODUCTS The flowers of the Elderberry plant are edible and they are used to make wine and to flavor candies and jelly. The fruits are used in wines, pie and jellies.

ADDITIONAL COMMENTS

BUFFALOBERRY

(*SHEPHERDIA ARGENTEA*)

HEIGHT/SPREAD/DBH Buffaloberries' height and spread are approximately equal and in the range of 6 - 12' (2 - 4 m). They are also grown as small trees which reach a height of 20' (6.6 m).

FORM The plants are large shrubs that are occasionally grown in cultured situations as small trees. They have solitary branches which are covered with silvery scales and dense layers of thorny twigs.

FOLIAGE Leaves that are covered on both sides with light silvery scales emerge in mid May. They go through a series of subtle color changes throughout the growing season, and by the Fall they turn grayish green silver before dropping in mid October.

FLOWER *Shepherdia argentea* is a dioecious species that blooms between March and May, before the leaves emerge. The male flowers occur in small clusters on the previous year's growth, while the yellow, bell-shaped females are either solitary or in small clusters. During the off-season, the plant's sex is easily determined by the shape of its flower buds. The male buds are fat and blunt, while the slender females come to a sharp point.

FRUIT Egg-shaped fruits, whose color varies from yellow or orange to red, are borne in clusters of up to five or they can be solitary. They reach maturity as early as July, but in the north, their season lasts well into the Fall. After ripening, the fruits persist through much of the Winter. Mature Buffaloberries are very bitter, but a hard frost sweetens their taste, and protection measures must be used to keep birds away while harvesting is delayed. Both male and female plants have to be planted for fruit production, and a minimum of one male for each five female plants is recommended.

RANGE *Shepherdia argentea* is a northern species which is native to the Canadian provinces and Montana and the Dakotas to scattered sites across Wyoming and Nebraska. It is tolerates very cold temperatures and grows in USDA zones 2 - 6.

MOISTURE REQUIREMENTS The species is often used in naturalized plantings because it has a high degree of drought tolerance and grows well on sites which are very dry and excessively drained. Buffaloberry grows best, however, in moist soils outside the floodplain where it is not subjected to flooding.

GROWTH RATE/LIFESPAN The species grows at a medium rate and has a long lifespan.

DISEASES/INSECTS Buffaloberries are highly resistant to insect pests and have very few disease problems although leaf spots, rust and powdery mildew occur on an infrequent basis.

OTHER DAMAGING AGENTS

ROOT SYSTEM *Shepherdia argentea* is a nitrogen-fixing species that has a system of deep laterals which make successful transplanting difficult.

HABITAT The species grows from mesic-dry stream banks too much drier, upland slopes.

SOIL REQUIREMENTS Buffaloberries are highly tolerant of alkaline soils with pH levels as high as 8.5 and grow in coarse to moderately coarse soils like sand and gravelly loams. They are sensitive to compacted soils and require a pH minimum of 6.1.

SUN/SHADE Full sunlight is required because the species is very intolerant of shade.

COMPETITIVENESS Buffaloberries are valued for their ability to thrive in cold climates and on dry, rocky sites where few other plants survive.

WILDLIFE VALUE Twelve bird species, including ring necked pheasants, western robins and sharp tailed grouse eat the fruits which are also eaten by black bears, chipmunks and other small mammals. The species can be used to deter livestock which do not browse the leaves.

WOOD CHARACTERISTICS The dark brown wood has little commercial value because of its softness.

PRODUCTS Pioneers used the fruit to make a relish served with buffalo meat. They can also be dried and used like raisins. Buffaloberries contain saponin which can cause severe indigestion when eaten in large quantities.

ADDITIONAL COMMENTS The plants are used for erosion control and in windbreaks and naturalized settings.

SNOWBERRY/BUCKBRUSH

(*SYMPHORICARPOS ALBUS*)

HEIGHT/SPREAD/DBH Snowberries height and spread are in the range of 3 - 6' (1 - 2 m), but they are usually much smaller than full size.

FORM The mature plant is a low, dense mound of erect stems. In the Fall, the fruit clusters weight pulls the slender stems downward.

FOLIAGE Light blue-green leaves with pubescent undersides emerge in early May. They retain their original color through Autumn before dropping in late October.

FLOWER *Symporicarpos albus* are a monoecious species whose flowers bloom from early June until early July, after its leaves have emerged. Individual clusters of white to pinkish flowers continue to appear until September.

FRUIT Snowberry produces large white berries that are solitary or arranged in small clusters. They reach maturity between early September and late November and persist through Winter.

RANGE The plant is a northern species which is native to Manitoba and Saskatchewan and found on scattered sites across Montana, the Dakotas, Nebraska, Wyoming and Colorado. It is hardy to USDA zone 2 and grows as far south as zone 7.

MOISTURE REQUIREMENTS The shrubs are highly intolerant of flooding and they have intermediate resistance to drought. Snowberries grow best in moist to dry, well-drained soils.

GROWTH RATE/LIFESPAN The species grows at a very fast rate and it has a short lifespan.

DISEASES/INSECTS Frequent disease problems including rusts, powdery mildew and leaf spots occur. A pair of anthracnose genera causes discoloration of the berries and leaf spotting. Insect damage is less frequent and primarily is the result of scale, aphids, stem galls, snowberry clearwing and glacial white fly.

OTHER DAMAGING AGENTS

ROOT SYSTEM Masses of root suckers, that are easily transplanted, grow from the fibrous root system.

HABITAT The species occurs in dry soils and on eroded rocky hillsides.

SOIL REQUIREMENTS Snowberries are adaptable to widely ranging conditions. They grow in all texture categories from clay to gravel and have intermediate tolerance to compaction. Their pH range is 6.1 to 8.5, and they grow well in thin soils overlaying bedrock formations.

SUN/SHADE Full sunlight to partial shade is the proper light condition for the plants.

COMPETITIVENESS The species has a tendency to spread and forms a dense, rounded colony of root suckers.

WILDLIFE VALUE Nearly 20 species of birds including ring-necked pheasants, ruffed grouse, cedar waxwings and bobwhite use the plant as a source of winter food and for cover. Snowberry is browsed by white-tailed deer and occasionally mule deer.

PRODUCTS

ADDITIONAL COMMENTS Snowberries are a good selection for eroded sites.

WOLFBERRY

(SYMPHORICARPOS OCCIDENTALIS)

HEIGHT/SPREAD/DBH Wolfberry's full height and spread are 3 - 6' (1 - 2 m).

FORM The plant is a low, mounded shrub which develops into a circular colony of suckers.

FOLIAGE Greenish yellow leaves emerge in mid May and turn blue green in the Fall. They retain this color until late Autumn, when the drying leaves' color reverts to yellow green and then they become tan. The small, thick leaves persist until February.

FLOWER Small clusters of inconspicuous, pink flowers bloom from mid June through mid July, after the leaves have emerged. *Symporicarpos occidentalis* are a monoecious species.

FRUIT Wolfberries are greenish white fruits that reach maturity between early September and late December. After ripening, they quickly turn brown and persist through early Winter. The small fruits, which are arranged in clusters of 10 -20 berries, are humanly inedible.

RANGE The species is native to the upper half of the Great Plains, beginning in northern Kansas, and is hardy to USDA zone 2.

MOISTURE REQUIREMENTS Wolfberries require moist to dry soil and are resistant to drought. They do not tolerate flooding or wet soils.

GROWTH RATE/LIFESPAN The species grows at a fast rate and has a short lifespan.

DISEASES/INSECTS Occasional disease and insect problems occur. These include anthracnose, powdery mildews, berry rot, aphids, snowberry clearwing and glacial whitefly.

OTHER DAMAGING AGENTS

ROOT SYSTEM The plants have fibrous root systems from which many suckers arise. These suckers are easy to transplant.

HABITAT Dry hillsides and rocky uplands are areas where Wolfberries commonly grow.

SOIL REQUIREMENTS The species grows in widely ranging conditions including acid to alkaline pH levels (5.5 - 8.5) and fine to coarsely textured soils. Wolfberries have intermediate resistance to soil compaction.

SUN/SHADE The plants do not tolerate shade.

COMPETITIVENESS Fast growth and prolific suckering cause the plant to quickly form a mounded, circular colony.

WILDLIFE VALUE Relatively few species of birds use the plant, but Wolfberries are an important source of food to ring-necked pheasants.

PRODUCTS Wolfberry is a good source of nectar for honey production.

ADDITIONAL COMMENTS The species is a good selection for eroded banks.

(TAXARIX SPECIES)

FRENCH TAMARISK (*TAMARIX GALLICA*) FIVE-STAMEN TAMARISK (*TAMARIX RAMOSISSIMA, FORMERLY PENTANDRA*)

HEIGHT/SPREAD/DBH French Tamarisk reaches a height of up to 33' (11 m). Five-Stamen Tamarisk grows to 10 - 15' (3.1 - 5.0 m) in height and it has a reduced spread.

FORM Both plants have irregular outlines made up of slender, twisting branches. French Tamarisk is a small tree or large shrub and Five-Stamen Tamarisk is a large shrub.

FOLIAGE Plants in the Tamarisk genus have finely-textured, scalelike leaves which are pale grayish green.

FLOWER Pinkish to white flowers are arranged in long, showy panicles that bloom for 4 - 6 weeks between Spring and late Summer.

FRUIT The fruits are tiny capsules with 3 to 5 valves. They open to release many tufted seeds.

RANGE Tamarix are native plants of Europe and the Middle East that have long since escaped cultivation in North America. French Tamarisk is found in Texas and Oklahoma and Five-Stamen Tamarisk grows in USDA zones 2 - 8.

MOISTURE REQUIREMENTS The plants are heavy water users that grow best in moist to wet soils. They are also drought tolerant, and French Tamarisk sustains itself through long periods of drought.

GROWTH RATE/LIFESPAN Tamarisk species have a fast rate of growth.

DISEASES/INSECTS Tamarix species are attacked by cankers, oystershell scale, root and wood rots, black vine weevils and powdery mildew.

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT Both plants grow on sand bars, along river banks and on exposed, windy sites. They are also found in salt marshes and along the ocean shore because of their high degree of salt tolerance.

SOIL REQUIREMENTS Each plant is very tolerant of poor soil conditions and grows in sand dunes and coastal soils with very high salt levels. French Tamarisk grows in highly alkaline soils and Five-Stamen Tamarisk tolerates acid soils.

SUN/SHADE Full sunlight is required for optimum plant growth.

COMPETITIVENESS The plants develop quickly into dense thickets because of their fast growth. Their outsized water requirements enhance their competitiveness because they take water needed by other plants.

WILDLIFE VALUE Although their seeds are of little or no value to wildlife, Tamarisks are excellent resources for cover and nesting.

WOOD CHARACTERISTICS French Tamarisk has a close grain and is frequently twisted or knotty. The polished wood is light colored.

PRODUCTS Five-Stamen Tamarisk is used as nectar source by honeybees.

ADDITIONAL COMMENTS Tamarisks are used in windbreaks and for erosion control on sand dunes.

NANNYBERRY

(VIBURNUM LENTAGO)

HEIGHT/SPREAD/DBH Nannyberry grows 10 - 30' (6 - 10 m) in height and has a variable spread which is most accurately described as 3/4 of the plant's height. The diameter of mature stems reaches 6" (15 cm).

FORM The species is grown as either a large shrub with several to many suckers or a small to a medium-sized tree. The crown is small and rounded and the upright branches arch gracefully.

FOLIAGE Light green leaves emerge in early May and become glossy as they darken over Summer. In the Fall, their color changes to a yellow-orange or orange-red mosaic before turning reddish purple. The leaves may go through all or part of the sequence before dropping in mid October.

FLOWER Large, flattened clusters of white flowers bloom from mid to late May, after the leaves have emerged. The fragrance of the monocious, star-shaped flower is strong.

FRUIT Yellows to red fruits are arranged in drooping clusters and turn black as they mature between August and October. They may ripen as late as December and persist through much of the Winter. The egg-shaped fruits are edible, but contain a large stone, and there is little of the sweet pulp.

RANGE *Viburnum lentago* is hardy to USDA zone 2 and planted as far south as zone 7. It is native to southern Manitoba and Saskatchewan and areas along the eastern fringe of the Dakotas and Nebraska. It is also found on scattered sites across the upper American Great Plains.

MOISTURE REQUIREMENTS The species does not tolerate flooding. It grows in soils with moderate to excessive drainage and resists drought.

GROWTH RATE/LIFESPAN Nannyberry is a fast growing species that is short lived. Young specimens grow an average of 24 - 36" (60 - 90 cm) per year.

DISEASES/INSECTS Mildew is a frequent occurrence, especially on plants growing in the shade.

OTHER DAMAGING AGENTS

ROOT SYSTEM *Viburnum lentago* has a shallow, fibrous root system that sends up several to many suckers.

HABITAT Nannyberry grows along the banks of rivers and streams, on dry and rocky hillsides and the edges of wooded areas. Normally, the species grows to 2,500' (750 m) in elevation, but on native sites in the Black Hills it occurs at 5,000' (1,500 m).

SOIL REQUIREMENTS Soil requirements range from moderately coarse to moderately fine soils within a pH range of 6.1 - 7.5. The species is sensitive to compaction and grows best in a variety of loamy soils.

SUN/SHADE Full sunlight reduces mildew. Nannyberry also grows in light to medium shade.

COMPETITIVENESS The root system normally sends up several to many suckers which form a leggy thicket. The plant reproduces by suckering heavily when above ground portions of the plant are removed.

WILDLIFE VALUE The sweet fruits are eaten by at least a dozen bird species including pheasants, gray catbirds, eastern bluebirds and sharp-tailed grouse. In addition, five species utilize the plant for cover. Raccoons, skunks, gray squirrels, and cottontail rabbit also eat the fruit. White-tailed deer browse the leaves and twigs of the plant.

WOOD CHARACTERISTICS The dark orange wood is heavy, close grained and hard, but isn't used commercially, because the stems are slender and their availability is limited. This species' common name is derived from the wood's goat-like smell when wet.

PRODUCTS

ADDITIONAL COMMENTS The plant is widely used as an ornamental, and it can also be planted on naturalized sites.

AMERICAN CRANBERRY BUSH

(*VIBURNUM TRILOBUM*)

HEIGHT/SPREAD/DBH The American Cranberry Bush's height and spread falls within a range of 6 - 12' (2 - 4 m) and it's usually taller than it is wide.

FORM *Viburnum trilobum* is a large, dense shrub with a rounded outline.

FOLIAGE Yellowish-green leaves with a reddish tinge emerge during mid May. Over Summer, they darken and become lustrous as they mature. In Autumn, the leaves revert to their original color, and their edges are deeply fringed with purple and red. The trilobed leaves drop in late November.

FLOWER The species is monocious. They have large, flattened clusters of white flowers that bloom between mid May and early June. Only the center flowers in each cluster are fertile. They are surrounded by an outer ring of showy, but sterile, flowers that the plant uses to attract pollinators.

FRUIT Ornamental clusters of orange to scarlet red fruit's reach maturity between late Summer and mid Fall. The fruits are edible, but quite tart, and they persist through February.

RANGE Within the Great Plains, *Viburnum trilobum* is native to southern Manitoba and a portion of eastern North Dakota. The plant is hardy in USDA zones 2 - 7.

MOISTURE REQUIREMENTS The species tolerates flooding for short periods, but deteriorate quickly under prolonged inundation. *Viburnum trilobum* grows fastest in moist, well-drained soils and they also grow in drier soils because of their drought tolerance.

GROWTH RATE/LIFESPAN The American Cranberry Bush has a medium rate of growth and its lifespan is relatively short.

DISEASES/INSECTS There are no serious disease or insect problems affecting the species, although they are susceptible to aphids. Stem blight can kill specimens grown in hot, humid climates.

OTHER DAMAGING AGENTS

ROOT SYSTEM Shallow. Fibrous roots comprise the plant's root system.

HABITAT American trilobum grows in wet. Swampy areas to mesic dry, upland sites.

SOIL REQUIREMENTS Near-neutral soils within the pH range of 6.6 - 7.5 are required. The plants resist soil compaction and grow in moderately coarse to fine-textured soils.

SUN/SHADE American Cranberry Bush grows in full sun to full shade.

COMPETITIVENESS

WILDLIFE VALUE At least seven bird species including wild turkey, eastern bluebirds and ruffed grouse eat the fruits, and they are especially favored by cedar waxwings.

WOOD CHARACTERISTICS

PRODUCTS Wine, jelly, sauces and jams are made from the fruits.

ADDITIONAL COMMENTS The plant has ornamental value, and it is a good selection for naturalized sites.

CLOVE CURRANT

(*RIBES ODORATUM*)

HEIGHT/SPREAD/DBH Clove Currant reaches a full height and spread of 6 - 12' (2.0 - 4.0 m).

FORM Young specimens have a rounded habit, but irregular branching and suckering lead to an upright, scraggly adult form.

FOLIAGE Deeply-lobed foliage emerges in mid April and matures to a bluish green hue. During Autumn, they turn dark red and then purple before falling in mid to late October.

FLOWER *Ribes odoratum* is a dioecious shrub that gets its common and Latin names from the strong, clove-like fragrance of its funnel-shaped flowers. Yellow and red flowers bloom between early April and early May and are arranged in clusters of up to 10 flowers.

FRUIT Following pollination, the flowers develop into juicy black berries that attract many birds when they mature in June or July.

RANGE Clove Currant is primarily a western species that is native to all of the states and provinces of the Great Plains. Its native range extends from southern Manitoba and Saskatchewan to the Texas panhandle, and it grows in USDA zones 3b - 6.

MOISTURE REQUIREMENTS The shrub grows in moisture situations ranging from well-drained soils to very dry conditions and does not tolerate flooding.

GROWTH RATE/LIFESPAN The species grows quickly and seldom live past the age of 20.

DISEASES/INSECTS Clove Currant is attacked by numerous diseases and insects, most notably leaf spots and anthracnose, and it is an alternate host to white pine blister rust.

OTHER DAMAGING AGENTS

ROOT SYSTEM The root system is made up of numerous fibrous roots from which many suckers develop.

HABITAT Clove Currant is found along the edges of woodlands in dry, upland areas.

SOIL REQUIREMENTS *Ribes odoratum* grows in loamy soils that are coarse to medium in texture, including thin soils that overlay limestone or sandstone deposits. The plant's pH requirements range from 6.1 - 8.5, and it has intermediate tolerance to compaction.

SUN/SHADE Clove Currant does not tolerate shade.

COMPETITIVENESS The plant quickly develops into a broad colony of suckers.

WILDLIFE VALUE The fruits are eaten by many birds and animals, and the leaves and stems are browsed by deer.

PRODUCTS The fruits are used to make jellies.

ADDITIONAL COMMENTS

ALPINE CurrANT

(*RIBES ALPINUM*)

HEIGHT/SPREAD/DBH *Ribes alpinum* reaches a full height and spread of 3 - 9' (1.0 - 3.0 m).

FORM The plant has a low, rounded form and a dense, upright habit.

FOLIAGE Alpine Currant's leaves emerge early each Spring, and the bright, three-lobed leaves are pale yellow in the Fall.

FLOWER *Ribes alpinum* is a dioecious species, with greenish yellow flowers that bloom in April and May. Male flowers predominate and occur in short clusters.

FRUIT Inedible, dark red berries reach maturity between May and July.

RANGE The plant is native to Europe and grows in USDA zones 2 - 7.

MOISTURE REQUIREMENTS The plant grows best in moist, well-drained soils.

GROWTH RATE/LIFESPAN *Ribes alpinum* develops at a medium rate of growth.

DISEASES/INSECTS The plant has significant disease and insect problems, the most serious of which are anthracnose and leaf spots.

OTHER DAMAGING AGENTS

ROOT SYSTEM

HABITAT

SOIL REQUIREMENTS The species grows in most types of soil, including calcareous soils, and its pH requirements range from 6.0 to 7.5.

SUN/SHADE Alpine Currant grows from full Sun to full shade, but does best in light shade.

COMPETITIVENESS

WILDLIFE VALUE

WOOD CHARACTERISTICS

PRODUCTS

ADDITIONAL COMMENTS

SMOOTH SUMAC

(*RHUS GLABRA*)

HEIGHT/SPREAD/DBH Smooth Sumac grows to 20' (6 m) in its tree-form and 7' (2.1 m) as a shrub. The spreads of both forms are roughly equal to the plants' heights.

FORM The plants have flat topped crowns which consist of several ascending branches.

FOLIAGE The long, pinnately compound, leaves are dark green and have a papery texture. Their Fall color varies greatly from orange to red or purple.

FLOWER The plant is dioecious and produces upright clusters of yellow-greenish flowers between June and August.

FRUIT Female plants bear dense clusters of dark red drupes. One-seeded fruits covered with short, sticky hairs mature in September and October and persist until the following Spring.

RANGE The plant's range primarily covers the eastern border of the Great Plains from Manitoba to Texas, and extends into the central, and sometimes western, portions of the states.

MOISTURE REQUIREMENTS Smooth Sumac does not tolerate flooding and grows best in soils that are moist and moderately well-drained. It also grows in dry conditions and resists drought.

GROWTH RATE/LIFESPAN The species grows quickly and has a short lifespan.

DISEASES/INSECTS There are few diseases or insect problems associated with the plants, although scale and aphids present occasional threats to them.

OTHER DAMAGING AGENTS Smooth Sumacs are frequently uprooted by high winds and heavy snows because of their shallow root systems.

ROOT SYSTEM The species has a shallow root system of lateral fibers that produce masses of root suckers.

HABITAT The species grows best in rich moist soils found near streams and rivers but are also capable of growing in poor, dry soils. *Rhus glabra* grows to an elevation of 7,000' (2,134 m).

SOIL REQUIREMENTS Smooth Sumac grows in nearly any type of soil with a pH between 5.0 and 7.0, but is sensitive to compaction.

SUN/SHADE The plant grows in full Sun to light shade.

COMPETITIVENESS Dense colonies of root suckers develop quickly.

WILDLIFE VALUE The fruit is eaten by more than 31 species of birds including catbirds, eastern bluebirds, wild turkeys and pheasants. The persistent fruits are a reserve source of food that are used when other, more palatable, foods are depleted.

WOOD CHARACTERISTICS The orange colored wood is soft, weak and brittle.

PRODUCTS

ADDITIONAL COMMENTS Smooth Sumac is the only woody plant species that is native to all 48 continental states. Ornamental cultivars are available.

LIST OF REFERENCES

Burns, Russell M. and Barbara H. Honkala. 1990. *Silvics of North America - Volume 1, Conifers.* Washington D.C.: Forest Service, United States Department of Agriculture.

Burns, Russell M. and Barbara H. Honkala. 1990. *Silvics of North America - Volume 2, Hardwoods.* Washington D.C.: Forest Service, United States Department of Agriculture.

Dirr, Michael A. 1990. *A Manual of Woody Landscape Plants.* Fourth Edition. Champaign, Illinois: Stipes Publishing Co.

Elmore, Francis H. 1976. *Shrubs and Trees of the Southwest Uplands.* Tucson, Arizona: Southwest Parks and Monuments Association.

Elias, Thomas S. 1987. *The Complete Trees of North America.* New York: Gramercy Publishing Co.

Farrar, John Laird. 1995. *Trees of the Northern United States & Canada.* Ames, Iowa: Iowa State University Press.

Grimm, William C. 1957. *The Book of Shrubs.* New York: Bonanza Books.

Harlow, William M., Ellwood S. Harrar, James W. Hardin and Fred M. White. 1996. *Textbook of Dendrology.* Eighth Edition. New York: McGraw-Hill Inc.

Hightshoe, Gary L. 1988. *Native Trees, Shrubs and Vines for Urban and Rural America.* New York: Van Nostrand Reinhold.

Jacobs, Woodrow C. 1968. *Climatic Atlas of the United States.* United States Department of Commerce. Environmental Science Services Administration. Environmental Data Service.

Kelly, George W. 1970. *Woody Plants of Colorado.* Boulder, Colorado: Pruett Publishing Co.

Kress, Stephen W. 1995. *The Bird Garden.* New York: Dorling Kindersley.

Kuhns, Michael, and David Mooter. 1992. *Trees of Nebraska.* Nebraska Cooperative Extension. EC 92-1774-X.

Little, Elbert L. 1980. *The Audobon Society Field Guide to North American Trees: Eastern Region.* New York: Alfred A. Knopf Inc.

Little, Elbert L. 1980. *The Audobon Society Field Guide to North American Trees: Western Region.* New York: Alfred A. Knopf Inc.

Martin, Alexander C., Herbert S. Zim and Arnold L. Nelson. 1951. *American Wildlife & Plants.* New York: McGraw-Hill Book Company, Inc.

Panshin, A.J. and Carl de Zeeuw. 1980. *Textbook of Wood Technology.* Fourth Edition. New York: McGraw-Hill Book Co.

Preston, Richard J. 1947. *Rocky Mountain Trees.* Second Edition. Ames, Iowa: Iowa State College Press.

Stephens, H.A. 1973. *Woody Plants of the North Central Plains.* Lawrence, Kansas: University Press of Kansas.

van der Linden, Peter J. and Donald R. Farrar. 1993. *Forest and Shade Trees of Iowa.* Second Edition. Ames, Iowa: Iowa State University Press.

Van Dersal, William R. 1938. *Native Woody Plants of the United States.* Washington D.C.: United States Department of Agriculture.

Vines, Robert A. 1984. *Trees of Central Texas.* Austin, Texas: University of Texas Press.

Welsch, David J. 1991. *Riparian Forest Buffers.* Radnor, Pennsylvania: United States Department of Agriculture, Forest Service, Northeastern Area. NA-PR-07-91.

Wilkinson, Kathleen. 1990. *Trees and Shrubs of Alberta.* Edmonton, Alberta: Lone Pine Publishing.

WILDLIFE USERS

Adams, George. 1994. *Birdscaping Your Garden*. Emmaus, Pennsylvania: Rodale Press.

* Elias, Thomas S. 1987. *The Complete Trees of North America*. New York: Gramercy Publishing Co.

Kress, Stephen W. 1995. *The Bird Garden*. New York: Dorling Kindersley.

* Martin, Alexander C., Herbert S. Zim and Arnold L. Nelson. 1951. *American Wildlife & Plants*. New York: McGraw-Hill Book Company, Inc.

* Van Dersal, William R. 1938. *Native Woody Plants of the United States*. Washington D.C.: United States Department of Agriculture.

* Available at C.Y. Thompson Library